

34<sup>th</sup>

**ANNUAL REPORT**

**of the  
Canadian Plant  
Disease Survey  
1954**

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BOTANY AND PLANT PATHOLOGY DIVISION  
CANADA DEPARTMENT OF AGRICULTURE







## FOREWORD

The Thirty-fourth Report of the Canadian Plant Disease Survey follows the familiar pattern of previous reports. The special reports scattered through the Report in order of their appearance are as follows: - "Notes on Some Nematode Problems, 1954" by A.D. Baker; "Phenological Data, 1954" by R.C. Russell and I.J. Bassett; "Rust Nurseries in Canada in 1954" by B. Peturson, G.J. Green and A.M. Brown; "Physiologic Races of Cereal Rusts in Canada in 1954" by T. Johnson, B. Peturson, G.C. Green and A.M. Brown; "Ergot in Cereals in Western Canada in 1954" by W.P. Campbell; "Flax Diseases in Manitoba in 1954" by W.E. Sackston; "Flax Diseases in Saskatchewan in 1954" by T.C. Vanterpool; "Diseases of Soybeans in Southwestern Ontario in 1954" by A.A. Hildebrand; "Sunflower Diseases in Manitoba in 1954" by W.E. Sackston; "Vegetable Disease Survey of the Holland-Bradford Marsh, 1954" by O.T. Page; and a report on tobacco diseases by Z.A. Patrick and L.W. Koch. A few contributors submitted photographs to illustrate their accounts of a particular disease.

I wish to take this opportunity of thanking the many contributors to the present report. Space will only permit mentioning the non-members of the Division, who have contributed. They are Mr. G.C. Morgan; Mr. S.R. Colpitts; Messrs. D. Leblond and J. Ringuet; Messrs. F. Godbout, E. Lavallee and R. Desmartau; Mr. P. Duval and Dr. J.E. Jacques; Dr. A.W. Henry; Mr. W. Lobey; Messrs. W.R. Foster and I.C. MacSwan; Mr. N. Mayers; and all the District Potato Inspectors. The French translation of "New and Noteworthy Diseases" was prepared largely by Mr. Albert Payette of the Translation Office of the Department.

A large part of the actual writing of the present Report was done after office hours in order to speed its completion. It is expected that this report will be processed and in the hands of the readers somewhat earlier than last year.

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24 May 1955  
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## New and Noteworthy Diseases

The year 1954 bears witness once more to the destructiveness of the cereal rusts over much of the wheat-growing area of the United States and Canada. Every condition appeared to be optimum for the development of a most widespread and destructive epidemic. Except for limited acreages of the stem-rust-resistant Selkirk and the leaf-rust-resistant Lee, all the wheat varieties cultivated in Western Canada are thoroughly susceptible to the prevailing races of leaf and stem rust. When the varieties Regent and Renown were first introduced in 1939, they were more resistant to leaf rust than Thatcher, the other stem-rust-resistant wheat commonly grown in the "rust area". However, since 1946, when new leaf-rust strains or races appeared, these two varieties have been almost as heavily rusted by leaf rust as Thatcher. In 1950, with the appearance of race 15B, all the stem-rust-resistant varieties developed in the '30's began to rust. In the succeeding years stem rust has caused increasing losses, especially in durum wheats.

In 1954, by late May abundant inoculum was present from Kansas southward. Strong winds in early June carried heavy loads of spores northward and deposited them over great areas in Sask., as well as central and eastern Man., more particularly in a zone extending from Regina to North Battleford. Rain that followed provided conditions ideal for spore germination and infection. Thus the epidemic had an early start as at that time much of the wheat was only leafing out. Leaf rust was so heavy that the leaves were killed soon after they unfolded and left the stems alone to support the plant. Finally later attacks by stem rust frequently caused the whole plant to dry up. In preliminary estimates, the loss was placed at not less than 135 million bushels.

On account of its resistance to the prevailing race of 15B, the new variety Selkirk will provide some immediate relief from rust damage. Yet, strains and races of stem rust to which Selkirk is susceptible have already been encountered. Moreover, varieties that might provide additional sources of resistance appear to possess protein characteristics of an undesirable nature for combination with the present varieties.

Dwarf bunt occurred in small amounts in several of the winter wheat areas of Ont. Evidence was obtained that dwarf bunt was present in Michigan over 60 years ago. How long dwarf bunt may have been present can only be determined by a critical examination of other collections of bunt made in still earlier decades of the last century. Eye spot (Cercospora herpotrichoides) must now be recognized as a disease of winter wheat in Ont.; it was found in several fields in Kent Co. Although common root rot (Helminthosporium sativum and Fusarium spp.) was unusually prevalent in Sask. and Alta. in 1954, it appeared to have caused less damage than in recent years. The wheat root parasite, Lagenidium radicola, was again demonstrated to be present in the heavy soils of the



Regina plains in Sask. and Cryptoascus graminis was found in Ont. for the first time. Streak mosaic (virus) was more prevalent in winter wheat in Alta. than in any year since its discovery in 1952; it was also seen in oats and barley in Alta. and in winter wheat in Sask. What may prove to be yellow dwarf (virus) was found on wheat, oats, and barley in the plots at Lethbridge, Alta.

Although the alfalfa variety Ladak is only partially resistant to bacterial wilt (Corynebacterium insidiosum) its replacement of Grimm in southern Alta. appears to have diminished the destructiveness of the disease. Leptosphaeria pratensis has long been known as the cause of a leaf spot of alfalfa but the pathogen has recently been demonstrated to be the cause of a crown rot in crops grown for seed in Man. Gloeosporium spadiceum was found for the first time in Eastern Canada when it was observed on red clover in a field in Que.<sup>b</sup> In general flax diseases were of little importance in Man. and Sask. in 1954. Yellows (virus) became widespread on flax, light infections being common in both provinces. For several years a Phoma, identified as P. exigua, which causes severe damage to germinating flax seed, was known from parts of Sask.; this year a basal stem rot, with Phoma pycnidia associated, was found in 4 Sask. fields. A protracted drought largely prevented any serious outbreaks of parasitic diseases in soybeans in southwestern Ont. On the other hand manganese deficiency of the soil was very evident over large areas in Essex and Kent counties. However, with many growers it has become standard practice to spray their crop with manganese sulphate when the symptoms appear, thereby greatly improving their returns. Distinct progress has been made in developing a hybrid sunflower resistant to rust. However, under weather conditions unfavourable for the crop yields were low and diseases more destructive than usual. Downy mildew (Plasmopara halstedii) is apparently becoming more severe in the main sunflower area. Also diseases, such as leaf mottle (cause unknown), are increasing in importance.

Plentiful rain and dull weather greatly favoured the development of vegetable crop diseases such as bean anthracnose; cucumber scab; the downy mildews of lettuce and onions in the Montreal district; and black leg, late blight and rhizoctonia stem rot of potatoes. A new field rot of carrots, caused by Phytophthora megasperma Drechsl., was found at Matsqui, B.C. Sclerotinia sclerotiorum caused heavy pod rot in a field in N.S.; apothecia were abundant.

Bacterial ring rot is now an established disease in Canada. However, its incidence in the various provinces depends basically on the measures taken by the provincial authorities. The disease is still a newcomer to Nfld. It also occurs at very low levels in B.C., P.E.I. and probably N.S. In no province is the average loss significant, but the aggregate loss may be considerable in Que. and Ont. In provinces where the growing of table stock is of primary interest, Alberta has been most successful in keeping ring rot at a very low level.



For the third year in succession late blight was present in every province in Canada. The disease was epidemic in the coastal areas of B.C., about Edmonton, Alta., over a great triangle in Sask. with vertex w. of Saskatoon and base along the eastern boundary, in southern Man., in some parts of Ont., and nearly everywhere in Que. and the Maritime Provinces. Losses from tuber rot were heavy on account of wet conditions extending into the harvest period. Moreover, severe field frosts, which occurred in several areas before the crop was harvested, added further to the losses. Only in P.E.I. where the epidemic was early, was the loss largely the result of reduced yields.

This year the latent virus S was demonstrated, by work done at Fredericton, N.B., to be present in Green Mountain potato plants growing in Canada. When this virus was originally reported from Holland, it was stated to be present in Dutch, German, English and American varieties.

An outbreak of fire blight (Erwinia amylovora) occurred in two apple-growing districts in s.w. Que. In Eastern Canada, scab (Venturia inaequalis) was prevalent over most of the area and caused considerable loss even in well sprayed orchards in N.B. and P.E.I. The use of eradicant fungicides to control scab whenever the protectant schedules are inadequate has greatly improved control of apple scab in commercial orchards in N.S. Pear blast (Pseudomonas syringae), a disease not previously recognized in Canada, was epidemic in the Saanich peninsula, B.C., in 1953, but was less destructive in 1954. Pears in the Niagara peninsula suffered 15-20% loss in store from rot caused by Phytophthora cactorum; heavy rains at harvest favoured spread of the disease. Brown rot (Monilinia fructicola) was severe on sweet cherries in the Niagara peninsula and on harvested peaches in all peach-growing districts in Ont. Peach leaf curl (Taphrina deformans) was prevalent on the B.C. coast. End-rot (Fusicoccum putrefaciens) is proving very destructive to the 1954 crop of cranberries in store in N.S. Red stele (Phytophthora fragariae) was observed for the first time in the Niagara peninsula, Ont. Verticillium wilt appears to be an important disease of strawberries in the Saanich peninsula, B.C.

From the records of diseases on trees and shrubs the following are of interest: an Elsinoe apparently new to science was collected on introduced species of Tilia in N.S.; Marssonina betulae Magn. on Betula papyrifera in N.B. appears to be a new North American record; Actinopelte dryina on Quercus borealis at Rougemont, Que., is a new Canadian record. These are all leaf spotting fungi. Further evidence was obtained from observations that the cultivated blue spruce, Picea pungens, is much more susceptible to the rust Chrysomyxa ledicola than white spruce, P. glauca. Weather conditions were particularly favourable for the development of aecia on Berberis, Rhamnus, Sorbus, etc.



Among the diseases of ornamental plants the following may be mentioned. A condition known as topple was quite severe on Chrysanthemum in a greenhouse at Regina, Sask. Three new Canadian records were carnation pimple (Xanthomonas oryzae (Uyeda & Ishiyama) Dowson var. dianthi Thomas & Dickens) on the variety Northland at Leamington, Ont.; leaf spot (Septoria lythrina) on cultivated Lythrum at Port Burwell, Ont.; and brown canker (Cryptosporium minimum Laubert) on rose near Victoria, B.C.



## Maladies nouvelles ou d'importance

Dans une bonne partie de la région à blé des Etats-Unis et du Canada, on se souviendra de 1954 comme d'une année où les rouilles des céréales se sont une fois de plus montrées capables de causer des pertes énormes. Tout a paru concourir à l'éclosion d'une épidémie de la plus grande envergure. Sauf de petites emblavures de Selkirk résistant à la rouille de la tige et de Lee résistant à la rouille des feuilles, tous les blés de l'Ouest du Canada sont des variétés très sujettes aux races prédominantes des rouilles des feuilles et de la tige. Lors de leur introduction en 1939, les variétés Regent et Renown étaient plus résistantes à la rouille des feuilles que le Thatcher, qui a été l'autre variété de blé résistante à la rouille de la tige qu'on cultivait communément dans la "zone de la rouille". Cependant, depuis l'avènement, en 1946, de nouvelles lignées ou races de rouille des feuilles, ces deux variétés se sont presque aussi fortement infectées de rouille que le Thatcher. L'apparition, en 1950, de la race 15B a marqué le début d'infection de rouille chez toutes les variétés résistantes à la rouille de la tige créées durant les années 30. Au cours des années subséquentes, la rouille de la tige a causé des pertes de plus en plus fortes, surtout chez les blés durs.

En 1954, vers la fin de mai, l'inoculum abondait depuis de Kansas vers le sud. De grands vents, au début de juin, ont transporté des quantités énormes de spores vers le nord et les ont distribuées dans de vastes régions de la Sask., de même que dans le centre et l'est du Man., plus particulièrement dans une région s'étendant depuis Regina jusqu'à North-Battleford. La pluie est ensuite venue apporter des conditions idéales à la germination des spores et à l'infection. Comme les blés, en général, venaient juste de produire des feuilles à ce moment, l'épidémie a débuté tôt. La rouille des feuilles a sévi assez fortement pour détruire les jeunes feuilles et dégarnir ainsi les tiges. Pour finir, la rouille de la tige s'est ensuite attaquée aux plantes, qui souvent se sont desséchées. Selon des estimations préliminaires, les pertes se sont chiffrées par au moins 135 millions de boisseaux.

En vertu de sa résistance à la race prédominante de 15B, la nouvelle variété Selkirk peut déjà compenser un peu les dégâts de la rouille. Mais voilà qu'il se présente des lignées et des races de rouille de la tige reconnues capables d'infecter le Selkirk. En outre, les variétés qui pourraient augmenter par ailleurs la résistance à la rouille de la tige possèdent des protéines indésirables, de sorte que ces variétés se prêtent mal à leur combinaison avec les variétés actuelles.

On a noté des infections peu importantes de carie naine dans plusieurs des régions à blé d'automne de l'Ontario. On est fondé à croire que cette maladie se rencontrait au Michigan il y a plus de 60 ans. Ce n'est que par l'examen critique d'autres spécimens de carie récoltés durant des décades encore plus reculées du siècle précédent qu'on pourra déterminer depuis combien de temps la carie naine a pu se présenter.



On peut désormais affirmer que la tache ocellée (Cercospora herpotrichoides) constitue une maladie du blé d'hiver en Ontario; on l'a trouvée en plusieurs champs dans le comté de Kent. En 1954, la pourriture ordinaire des racines (Helminthosporium sativum et Fusarium spp.) était plus répandue que d'habitude en Saskatchewan et en Alberta, mais les pertes ont été moins fortes que durant les dernières années. On a de nouveau décelé la présence dans les sols lourds des plaines de Regina en Saskatchewan du parasite des racines du blé, Lagenaria radiculicola, et l'on a trouvé pour la première fois en Ontario Cryptosporium graminis. La mosaïque striée (virus) était plus répandue chez le blé d'hiver en Alberta qu'en toute autre année depuis sa découverte en 1952; on l'a de même observée chez l'avoine et l'orge en Alberta et chez le blé d'hiver en Saskatchewan. Dans les parcelles de Lethbridge (Alta.), on a trouvé sur le blé, l'avoine et l'orge ce qui est peut-être la jaunisse naine (virus).

Bien que la variété de luzerne Ladak ne soit que partie élément résistante à la flétrissure bactérienne (Corynebacterium insidiosum), sa substitution à la Grimm dans le sud de l'Alta. a manifestement atténué les méfaits de la maladie. On sait depuis longtemps que Leptosphaeria pratensis peut causer une tache des feuilles de la luzerne, mais ce n'est que récemment qu'on l'a trouvé responsable d'une pourriture du collet dans des luzernières établies au Man. en vue de la production de la graine. Dans un champ de trèfle rouge, dans la province de Québec, on a signalé Gloeosporium spadiceum; c'est la première mention qui en est faite dans l'Est du Canada. En 1954, au Man. et en Sask., les maladies du lin n'ont guère eu d'importance, en général. La jaunisse (virus) s'est répandue largement dans les linières, et l'on pouvait communément voir des cas d'infection légère dans les deux provinces. Depuis plusieurs années, on connaissait, en certains endroits de la Sask., une espèce de Phoma, le P. exigua, très dommageable aux graines de lin en germination; cette année, on a trouvé dans quatre champs en Saskatchewan une pourriture du pied portant des pycnides de Phoma. Dans le sud-ouest de l'Ont., une sécheresse prolongée a grandement contribué à prévenir toute infection sérieuse des fèves soja. D'autre part, il y avait carence manifeste de manganèse dans le sol dans de grandes étendues des comtés d'Essex et de Kent. Plusieurs producteurs ont cependant pris la bonne habitude d'arroser leurs cultures avec des solutions de sulfate de manganèse dès l'apparition des symptômes, ce qui a de beaucoup augmenté leurs profits. La création d'un tournesol hybride résistant à la rouille marque un grand progrès. Cependant, les rendements ont été plus faibles et les maladies plus dommageables que d'habitude, en raison de conditions climatiques défavorables aux cultures. Le mildiou (Plasmopara halstedii) devient manifestement plus grave dans la principale région à tournesol. De même, certaines maladies comme la marbrure des feuilles (cause inconnue) gagnent du terrain.

Les pluies abondantes et le mauvais temps ont beaucoup favorisé les maladies des légumes, notamment l'anthracnose des haricots, la gale du



concombre, les mildious de la laitue et de l'oignon dans la région de Montréal, ainsi que la jambe noire et le mildiou de la pomme de terre et la rhizoctonie du pied de la pomme de terre. Une nouvelle pourriture des carottes dans le champ, causée par Phytophthora megasperma Drechsl. a été signalée à Matsqui (C.-B.). Sclerotinia sclerotiorum a causé beaucoup de pourriture des gousses dans un champ en N.-E.; on pouvait voir de nombreux apothèques.

La pourriture de cerne ou flétrissure bactérienne est désormais bien implantée au Canada. Son incidence dans les diverses provinces, toutefois, dépend essentiellement des mesures prises par les autorités provinciales. La maladie en est encore à ses débuts à Terre-Neuve. Elle demeure négligeable en C.-B., dans l'Ile du P.-E. et probablement en N.-E. Dans aucune province, les pertes n'atteignent une moyenne importante, mais la somme des dégâts dans les provinces de Qué. et d'Ont. peut être considérable. De toutes les provinces où l'on cultive surtout la pomme de terre de consommation, l'Alta. a le mieux réussi à tenir la flétrissure à un niveau très bas.

Pour la troisième année consécutive, le mildiou s'est trouvé dans chaque province au Canada. La maladie a sévi à l'état épidémique dans les régions côtières de la C.-B.; aux environs d'Edmonton (Alta.); en Sask., dans un vaste triangle dont le vertex se trouvait à l'ouest de Saskatoon et la base le long de la frontière est; dans le sud du Man.; en certaines parties d'Ont. et presque partout dans Qué. et les Provinces Maritimes. L'humidité a persisté jusqu'à la fin de la récolte, causant la pourriture d'un grand nombre de tubercules. Par ailleurs, de fortes gelées survenues dans plusieurs régions avant l'arrachage ont encore aggravé les dégâts. Ce n'est que dans l'Ile du P.-E., où l'épidémie a sévi de bonne heure, que les pertes ont été attribuées surtout à une diminution de rendement.

Des recherches effectuées cette année à Fredericton (N.-B.) ont révélé la présence du virus latent S dans les plantes de pomme de terre Montagne verte cultivées au Canada. Lorsque la présence du virus a été mentionnée pour la première fois en Hollande on a dit qu'il se retrouvait chez les variétés hollandaises, allemandes, anglaises et américaines.

Deux cas de brûlure bactérienne (Erwinia amylovora) se sont présentés dans des régions à vergers du sud-ouest de la province de Qué. Dans l'Est du Canada, la tavelure (Venturia inaequalis) s'est presque généralisée et elle a causé de lourdes pertes même dans les vergers bien arrosés du N.-B. et de l'Ile du P.-E. L'emploi d'éradicants contre la tavelure lorsque les protectants ne suffisaient pas a grandement facilité la mise en échec de la maladie dans des vergers commerciaux de la N.-E. La brûlure bactérienne du poirier (Pseudomonas syringae), maladie jusqu'alors inconnue au Canada, a sévi à l'état épidémique en 1953 dans la péninsule de Saanich (C.-B.), mais elle a été moins destructive en 1954. Les



poires de la péninsule de Niagara ont subi des pertes de l'ordre de 15 à 20 p. 100 en entrepôt à la suite d'une pourriture causée par Phytophthora cactorum; les fortes pluies au temps de la cueillette ont favorisé la dissémination de la maladie. La pourriture brune (Monilinia fructicola) a sévi sur les cerises douces dans la péninsule de Niagara ainsi que sur les pêches venant de toutes les régions à pêches de l'Ontario. La cloque du pêcher (Taphrina deformans) était répandue sur la côte de la C. -B. La pourriture apicale (Fusicoccum putrefaciens) a causé des dommages considérables aux atocas en magasin dans la N. -E. Dans la péninsule de Niagara (Ont.), on a décelé pour la première fois le coeur rouge (Phytophthora fragariae). Dans la péninsule de Saanich (C. -B.), la flétrissure verticillienne se révèle une maladie importante du fraisier

Les mentions suivantes des maladies des arbres et des arbustes présentent un certain intérêt : une espèce d'Elsinoe qui semble nouvelle pour la science et dont on a récolté des spécimens sur des tilleuls importés en N. -E.; Marssonina betulae Magn. sur Betula papyrifera au N. -B. paraît constituer une première mention en Amérique du Nord. Actinopelte dryina sur Quercus borealis à Rougemont (P. Q.) est une première mention pour le Canada. Ce sont là autant de champignons de taches des feuilles. D'autres observations corroborent l'opinion que l'épinette bleue cultivée, Picea pungens, est beaucoup plus sujette à la rouille Chrysomyxa ledicola que ne l'est l'épinette blanche, P. glauca. Le temps a été particulièrement propice à la formation d'écidies sur Berberis, Rhamnus, Sorbus, etc.

Suivent quelques mentions de maladies de plantes ornementales. Dans une serre de Regina (Sask.), on a vu sévir sur Chrysanthemum un désordre appelé affaissement ("topple"). Et voici, pour finir, trois mentions nouvelles pour le Canada: la pustule de l'oeillet (Xanthomonas oryzae (Uyeda & Ishiyama) Dowson var. dianthi Thomas & Dickens) sur la variété Northland à Leamington (Ont.); la tache des feuilles (Septoria lythrina) sur la salicaire cultivée, à Port-Burwell (Ont.); et le chancre brun (Cryptosporium minimum Laubert) sur le rosier, près de Victoria (C. -B.).



## The Weather and Its Influence on Disease

In B.C., the fall of 1953 was one of the wettest on record. Because of heavy rains some bulb growers, particularly those on the mainland, were unable to complete the planting of crops until mid-December. In some fields the soil was so wet that it worked poorly and remained in a lumpy condition throughout the growing season. The winter was generally cool and wet, but the ground did not freeze to any depth. Losses from drowning were heavier than usual. The growing season opened at least two weeks later than usual and continued to be backward throughout. Flowers for the early market were not ready for cutting for at least 3 weeks later than in 1953. The wet season prevented effective cultivation and weed control. Foliage diseases were very prevalent and caused heavy losses, except where the recommended control measures were followed. Weedy fields and those confined by woods were severely affected by leaf diseases (N. Mayers).

In B.C., the summer of 1954 was one of the wettest on record and as a result many agricultural crops were adversely affected. The precipitation was in general high and conversely the amount of sunshine was low. Under these conditions, the stand and growth of potato crops were good in the early part of the season, but, when the weather continued wet into mid-summer and early fall, weed control in and cultivation, spraying and harvesting of the crop were hampered. In the northern part of B.C. field frost in early October caused a 60% loss in the potato crop (H.S. MacLeod).

On Vancouver Island, the summer was relatively cold and moist. In the spring iris and tulip buds suffered slight injury from frost in some low-lying fields. This injury may have provided conditions favourable for *Heterosporium* leaf spot, which was more prevalent than usual on bulbous iris. In general, secondary infection by tulip fire was less than 1953 and its reduced prevalence was due to the rainfall being less than usual in May. On the other hand, soil moisture was ample for development of daffodils and tulips as the bulbs of these plants were well sized at harvest.

Late blight of potatoes was first observed in early August. As a result of high precipitation in that month the disease became epidemic on potatoes and tomatoes. Infection of orchard grass by a new downy mildew (*Sclerophthora* sp.) was favoured by very high rainfall in November. Pure stands of the grass were severely affected in some fields (W. Jones).

On the lower mainland, the winter of 1953-54 was characterized by very heavy snow cover in January and absence of any winter damage to small fruits. The spring was cold and the mean temperatures for May, June and July were the lowest on record. Rainfall was well above average in June and early July. From mid-July to mid-August the weather was dry but a period of rainy weather lasted from mid-August to mid-September. October was relatively dry and November very rainy. Although only 0.01 in. of rain was recorded from 12 July to 13 Aug., a total of 7.93 inches fell between 1 June and 30 Sept. This total is about 2.4 in. above



the 15-year average. Conditions favouring late blight development prevailed from 14 Aug. until 19 Sept. as during that period some precipitation occurred on all but six days. Potato growers were warned by the Assistant Provincial Plant Pathologist that a serious outbreak was likely to occur. Extensive foliage infection was prevented by fungicides, but considerable loss resulted from tuber infection (H.N.W. Toms).

In the Okanagan and the Kootenays the winter was mild with average snowfall, except in the eastern Kootenays, where more snow fell than usual. Moisture was above normal until early July, but growing conditions were excellent for most crops. The potato crop was harvested under favourable conditions and proved to be excellent (H.S. MacLeod).

The spring of 1954 in Alta. was the coolest on record. The highest daily temperature at Edmonton did not exceed 29° F. during the last ten days of April and for the growing period of May to September, inclusive the average temperature was nearly two degrees below the long-term average. The summer was very cloudy, with extended periods of fog or light rain, particularly in August. South-east winds in June brought showers of stem rust spores. Stem rust of wheat was first recorded in Alberta on 6 July. The damp weather favoured the development of the rusts and other foliage diseases of the cereals and legumes. The latter half of August was either foggy or overcast. Late blight, which started to develop about mid-August, ruined many fields of potatoes in the Edmonton district (W.P. Campbell).

At Saskatoon, Sask., the summer of 1954 was one of the wettest, coolest and dullest on record. Crops could not make adequate use of the extra moisture because the low temperatures and insufficient sunshine did not favour growth. Precipitation was recorded on 80 of the 153 days during the months of May to September, or on 36 days more than usual. In August rain fell on 23 days, with a record total of 6.96 in. (T.C. Vanterpool).

In Saskatchewan, the spring was cold and backward especially in the northeast. Moisture was plentiful in most parts and germination was good, but growth was slow. Rainfall was much above normal in most areas. During the wet weather in June, many wheat fields turned yellow as a result of attack by Helminthosporium tritici-repentis. Very shortly afterwards, wheat began to show infection by stem and leaf rust, which appeared first about 20 June in the Saskatoon - North Battleford area. Cool, showery weather delayed crop development and favoured rust development. The wheat crop headed about 2 weeks later than usual and was already partially defoliated by leaf rust. Cool wet weather continued during July and August. As a result, there developed one of the worst epidemics of leaf and stem rust in the history of the province; the ripening of the crop was also delayed. Danger from frost became acute and frost damage was considerable in the northeastern part of the province. The weather continued wet during September and much of the wheat was harvested in a damp condition; in some areas the fields were too wet for



movement of machines. Dry cool weather in October allowed the harvest to be completed. Wheat was mostly low in grade but oats and barley were of good quality except where frost had damaged the crops (H. W. Mead).

Weather conditions in Man. were very similar to those experienced in Sask. (see Rust Nurseries report). They greatly favoured the development of leaf and stem rust on wheat. On account of the severity of the rust epidemic, wheat yields in Man. were very similar to those obtained in Sask., except that the crop was harvested under somewhat better conditions. Leaf diseases of barley were also very destructive in Man. (B. Peturson).

In the Niagara peninsula, Ont., showers were frequent and weather dull 25-30 April. As the mean temperature remained below 50° F., little primary scab infection took place in spite of a 30-hour wetting period when the apple buds were at the tight cluster bud stage. Warmer weather the first few days of May advanced buds to the full pink stage. Brief wet spells with night temperatures below 40° F. were unfavourable for scab infection. Sparse primary infection was found 17 May, but ascospore discharge remained low and scab development very slight through June and July. As a result of frequent rains in late August and September new scab infections appeared on the terminal leaves and fruit on unsprayed trees. Fruit on sprayed trees was harvested free of scab but some late-season infection developed on apples in common store.

Also because of cool weather during the blooming period, very little blossom blight developed in the laboratory orchard, St. Catharines, on pear trees, which were mass inoculated with the fire-blight organism when the trees were in bloom. However when the temperatures moderated in late May and June, spur and twig blight developed freely on the inoculated trees.

On the other hand, the season was such that brown rot was prevalent and widespread on stone fruits in the Niagara peninsula. Apothecia were first noted on 29 April when peach trees were still in the pink bud stage. Apothecia continued to develop through the bloom period. Although it was cool, warm rains lasting 8 hours on 3 and 7 May provided conditions favourable for blossom infection of peaches and sweet cherries. The outbreak of blossom blight was followed by rot in the green and ripe fruit of cherries. In some varieties the fruit clusters were destroyed. On peaches the blight spread from the blossoms into the twigs, where cankers developed and considerable die-back occurred. Undoubtedly spore inoculum was very abundant when the fruit was harvested. In addition humidity and temperature were optimum for brown rot development over much of the period during which the fruit was moving from the orchard to the consumer. Rot was particularly heavy in early varieties of peaches.

Rains in August and early September favoured powdery mildew infection on the grape variety Agawan. Extra spray applications were required to prevent loss of foliage.

An unusual outbreak of rot caused by Phytophthora cactorum developed on Kiefer pears held in common store. It was established that the fruit had been left after they were picked in containers in the orchards where they were exposed to splashing and flooding by heavy rains on 2-3 Oct. and frequent showers and high winds on 10-15 Oct. Spores of the fungus had been splashed or washed, along with soil particles, onto the fruit (G.C. Chamberlain).

In southwestern Ont., the early part of the season was quite normal, but crops suffered from a long period of drought in the middle of the summer, July being the driest month on record over most of the area. As a result, physiologic disorders, such as manganese deficiency in soybeans and blossom-end rot of tomatoes were more destructive than usual. On the other hand many of the parasitic diseases were of little importance in 1954 (A.A. Hildebrand).

In the Ottawa valley, rainfall was plentiful throughout the season. As a result late blight and several other parasitic diseases were more abundant than usual. Frequent rains delayed farm operations particularly during haying (E.H. Peters).

In southwestern Que., the 1954 season was one of the wettest on record, the rainfall being particularly heavy in the spring months. As a result, sowing and planting was delayed and crops in general were adversely affected. The conditions also favoured the development of disease in most crops; only those on well-drained locations and thoroughly protected by fungicides yielded well. Pastures and grasses were the only crops that benefited from the wet season (L. Cinq-Mars).

At Ste Anne de la Pocatiere, Que., the mean temperature was slightly below the average in May and June, considerably below in July, somewhat below in August and was normal in September. Rainfall was substantially above average throughout the season. Rain and northeasterly winds in May and rainy cool weather in early June delayed seeding until 15 June. Aecia of crown rust were abundant on Rhamnus cathartica and R. alnifolia. Blister rust was conspicuous in stands of young white pine. In July, apple scab was prevalent in most orchards and proved very difficult to control. In August, the weather was still wet and cool and in consequence diseases such as black leg and late blight of potatoes were very prevalent. Mushrooms were exceptionally abundant. September was likewise wet; diseases such as the rusts of cereals, late blight of potato and tomato, and apple scab were epidemic. Thus climatic conditions in 1954 were very favourable to plant diseases (H. Genereux).

Although sub-zero temperatures were recorded at Fredericton, N.B., on 15 days in January, with a low of  $-17^{\circ}$  F. on one night, these temperatures were about normal for the month. Sub-zero temperatures were recorded only on 4 days in February and one in March; a good blanket of snow covered the ground during this period and as a result there was little winter injury to perennial crops.

During April, May, and June the weather was cool, wet and dark.



Rain fell almost every other day and amounted to nearly 16 in. for the three months. As a result, many growers were delayed in sowing their grain or planting potatoes. The first discharge of ascospores of the apple scab fungus took place on 10 May. July, August and September were cooler than usual and almost 15 inches of rain fell in the period. Under these conditions much of the mown hay was lost before it could be cured. Crops of pumpkins, squash, cucumber, beans and corn failed to mature properly. Both parasitic and saprophytic fungi were abundant. Late blight of potatoes appeared about 18 July and where strenuous efforts were made to control the disease it was held partially in check. Where the control practices were indifferent, the vines rotted early in the season, in some fields just as the tubers had formed. In most fields bacterial soft rot was prevalent in tubers affected by late blight. Late blight developed so early that bacterial ring rot was almost impossible to detect in the field. Most apple orchards suffered severely from scab. Wet weather delayed harvesting of the potato crop and caused large amounts of soil to adhere to the tubers. Frost in late September caused considerable injury to potatoes still unharvested. October and November were also wet and cool (J. L. Howatt).

Total precipitation at Kentville, N.S., for 1954 will probably be slightly above the 40-year average of 40.58 in. However, the distribution was not normal as 12.7 in. fell in January and February, an excess of 5.4 in. while most of the months during the growing season showed a marked deficit. The deficit during the summer might have caused a drought condition, but the monthly mean temperatures during these months were 1 to 2 degrees lower than usual and there were many dull, cloudy days with frequent showers. The net result was that there were periods favourable for plant diseases, particularly in August when rainfall was slightly above average.

Late blight of potatoes was found in July in a commercial field and developed steadily. By mid-August the disease was destroying potato fields in Yarmouth and Digby counties but timely spraying held it in check in the commercial areas. September was dry and harvested potatoes show very little blight rot. The torrential rainfalls associated with a number of the big storms of the 1954 season missed the Annapolis Valley. Yarmouth and Digby counties received a 6 in. rainfall in June that was light at Kentville, and the rainfall associated with the two hurricanes Carol and Edna was only .75 and .47 in. respectively.

The dull, cloudy weather favoured willow blight, which was very sev. on the few surviving trees and suckers that can be found in N.S. It was also favourable for development of grey mould and crops such as strawberries, tomatoes and gladioli showed greater amounts than usual (J. F. Hockey).

At Charlottetown, P.E.I., precipitation was above average for the first 3 months of 1954, and totaled 15.98 in. made up of 7.13 in. rain,

and 88.5 in. of snow. Snow coverage was adequate during this period. During the remaining months of the year, excepting May and July, precipitation was below average despite the fact that the crop season was damp and cool and rain fell on 16, 19 and 18 days respectively during July, August and October. Sunshine was also below average during these three months. There were 157 frost free days recorded at Charlottetown between 4 May and 8 Oct.

Weather conditions were generally favourable for foliage diseases during the growing season. Apple scab and late blight of potatoes were sev. and frequent applications of fungicides were necessary in order to obtain a fair measure of control. Unsprayed and poorly sprayed potato fields were destroyed early by late blight and a very light crop was harvested from these fields. Club root was sev. in infested fields of Laurentian swedes. Bean anthracnose was unusually sev. and cucumber scab was destructive in home and market gardens. Commercial growers of pickling cucumbers escaped the disease by planting the resistant variety, Maine No. 2. Septoria culm rot was severe on Abegweit oats. The aecial stage of crown rust was of less prevalence on buckthorn than usual because of dry weather in June and early July; however, this rust was quite general on oats. Black leg and Verticillium wilt of potatoes were not serious (J.E. Campbell).

In Nfld., spring planting was greatly delayed as precipitation during March, April and May totaled 14.6 in. of which 5.5 in. fell in May. During the summer and fall months 21 in. were recorded and temperatures were relatively high. Thus conditions were ideal for the development of many diseases, especially late blight and wart of potato. The hay crop was good but continuous rainy weather during haying caused spoilage of many tons of hay. Frost on 7 and 8 Oct. destroyed the tops of potatoes and wet, cold weather greatly retarded harvesting of the tubers (G.C. Morgan).

#### Notes on Some Nematode Problems, 1954

A.D. Baker

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The golden nematode, Heterodera rostochiensis (Wollenweber, 1923) Franklin, 1940, has not yet been found in any part of Canada. Unfortunately on February 15, 1955, The Victoria Daily Times erroneously reported its probable presence in British Columbia. As this was a false rumor The Times was asked to correct the statement.

The sugar-beet nematode, Heterodera schachtii Schmidt, 1871, did not occasion any severe injury in sugar-beet fields of the Sarnia Ont., area in 1954. A possible lowering of the infestation level may be due to more strict attention to crop rotations in this district.



The oat nematode, Heterodera avenae (Lind, Rostrup, and Ravn, 1913) Filipjev, 1934, continues to be a pest of importance in Ontario. In 1954 heavily infested oat plants were received from the following localities in Ontario: Aurora, Belhaven, Uxbridge, Bowmanville, Petersburg, and Preston.

Heterodera punctata Thorne, 1948, was named and described from infested wheat in Western Canada. Accordingly, for some time it was referred to by the common name of wheat nematode. Later infestations of this species were reported from Europe but always as a pest of grasses. In September of 1954 the writer visited a number of previously infested fields in Saskatchewan under the guidance of Dr. R. C. Russell, University of Saskatchewan, who first located this pest. A number of spot samples were obtained from these fields including the areas within the fields where the infestation had been heaviest. All these samples were carefully washed and screened at Ottawa and not a single cyst was found. These fields were all in grain in 1954. It is hoped that further search may be made, but it may well be that the present European common name of grass nematode is the more suitable. The difference in reported host plants between Canada and Europe left some slight doubt as to the identity of the species.

The northern root-knot nematode, Meloidogyne hapia Chitwood, 1949, was found on the roots of Fragaria vesca at Kentville, N.S., on carrot from Thedford Marsh, Ont., and from roots of African violet at Ottawa.

Records of infestations of root-lesion nematodes include the following. Pratylenchus penetrans (Cobb, 1917) Sher and Allen, 1953, was recorded from Fragaria vesca roots at Kentville, N.S., daffodil bulbs and tulip roots from Vancouver, B.C., nursery soil from Port Burwell, Ont., red clover roots and soil from Merivale, Ont., roots of African violet and soil at Ottawa, maple tree roots from Ottawa, and apple tree roots from the Okanagan Valley, B.C. Pratylenchus minyus Sher and Allen, 1953, was found attacking corn at Ottawa, oats from Uxbridge, Hampton, and Port Perry, Ont., barley and cultivated and wild oats from Aurora, Ont., and wheat from Harrow, Ont. Pratylenchus pratensis (deMan, 1880) Thorne, 1949, was found in strawberry roots from Stanstead, Que., and from Fredericton, N.B., oat roots from Merivale, Ont., and Fragaria vesca roots from Kentville, N.S. Pratylenchus vulnus Allen and Jensen, 1951, was obtained from rose roots grown in a greenhouse at Mount Bruno, Que.

Ring nematodes, Criconeimoides spp., were found in strawberry soil from Fredericton, N.B., and Stanstead, Que., rose roots in a greenhouse from Mount Bruno, Que., maple tree soil and vetch soil at Ottawa, and in soil from the roots of Fragaria vesca from Kentville, N.S.

Although occasional new records of the potato-rot nematode, Ditylenchus destructor Thorne, 1945, have been obtained from Prince Edward Island, there is no clear evidence that the total infestation has become greater. Most of the findings have been trace infestations, and potato harvesting usually reduces the population level. In 1954 this nematode was found at McNeill's Mills, P.E.I. English iris bulbs intercepted from Noordwyk, Holland, contained nematodes conforming to the characters given for this species.

Other plant-parasitic nematodes encountered during 1954 include the following. Spiral nematodes, Rotylenchus spp., were found in soil from Kentville, N.S., Fredericton, N.B., Merivale, Sarnia, and Ottawa, Ont. Psilenchus hilarulus deMan, 1921, was found in grass sod at Ottawa, Ont., Hemicycliophora sp. in tulip soil from Walkerville, Ont., and stunt nematodes, Tylenchorhynchus sp., in oat soil from Preston and Merivale, Ont. A pin nematode, Paratylenchus sp., was reported from apple roots from the Okanagan Valley, B.C., in oat soil in Merivale, Ont., in maple tree soil from Ottawa, and in tulip soil from Walkerville, Ont. Dagger nematodes, Xiphinema sp., were found in tuberous begonia soil from Sarnia, Ont., and from a maple tree from Ottawa. A grass nematode, Anguina agrostis (Steinbuch, 1799) Filipjev, 1936, was found in the heads of Poa pratensis from Cornwall, Ont.

The foliar nematode, Aphelenchoides ritzema-bosi (Schwartz, 1911) Steiner, 1932, was found in chrysanthemum leaves from St. Catharines, Ont. Aphelenchoides parietinus (Bastian, 1865) Steiner, 1932, was found in potato tubers from Prince Edward Island, narcissus bulbs from Montreal, strawberry soil from Fredericton, N.B., lesions on chrysanthemum roots from St. Catharines, Ont., and shasta daisy from London, Ont. Aphelenchoides avenae Bastian, 1865, has been found in oat soil from Aurora and Merivale, Ont., in shasta daisy from London, Ont., in lesions on chrysanthemum roots from St. Catharines, Ont., in narcissus bulbs from Beaurepaire, Que., close to peony roots from Ayers Cliff, Que., in potato tubers from P.E.I. and in apple from the Okanagan Valley, B.C.

A number of new records of predacious nematodes belonging to the genus Mononchus have been obtained by Mr. R.H. Mulvey of the Ottawa laboratory, a specialist in this group. M. brachyuris (Butschli, 1873) Cobb, 1917, was found in soil around begonia roots at Sarnia, Ont., lawn soil from Capreol, Ont., oat soil from Belleville, Ont., and ditch soil from Blackwell, Ont. M. longicaudatus (Cobb, 1893) Cobb, 1916, was found in ditch soil at Blackwell, Ont., and M. muscorum (Duj., 1845) Cobb, 1916, in grass sod from Blackwell, Ont., meadow sod from Norton, N.B., mountain soil from "Summit", Princeton, B.C., and streamside soil from Hope, B.C. M. papillatus (Bastian, 1865) Cobb, 1916, was found in lakeshore soil from Sunnydale, Ogden County, Que., and from grass sod at York, P.E.I. M. parabrachyuris Thorne, 1924, was identified from ditch soil from Blackwell, Ont., and M. parvus (deMan, 1880) Cobb, 1916, in tobacco soil in Harrow, Ont., and from tulip-bed soil from Walkerville, Ont.



It would appear very desirable if more attention were given to the recording of the numerous species of free-living nematodes from soils in different localities. The role that is played by many of these is still rather obscure, but it is not unreasonable to presume that they may play an important part in the problems of soil fertility with possible interrelation with other organisms. Meanwhile we should endeavour to accumulate more of this type of information. Nematologists are in short supply and it is natural that the main demands on their time are directed toward finding solutions to problems associated with nematodes of known economic importance. However, as time permits, such records obtained at the Ottawa laboratory are now being included in reports in The Canadian Insect Pest Review.

#### Phenological Data - 1954

The phenological data for 1954 make abundantly clear the lateness of the season at the three places where records were taken. Most of the species listed bloomed about two weeks later than usual. Excessive moisture and cloudy weather held back plant growth throughout the season. Wheat matured in less time at Saskatoon than at Winnipeg or Edmonton. The data are summarized in the accompanying table.

The data were collected at Edmonton, Alta., by W.P. Campbell, at Saskatoon, Sask., by R.C. Russell and at Winnipeg, Man., by P. Peterson (R.C. Russell).

The first flowering dates for the majority of plants recorded at Ottawa, Ont., were about normal for the first part of the year. Anthesis dates were as follows:-

<i>Acer saccharinum</i>	11/4	N	<i>Sambucus nigra</i>	18/6	IL
<i>Populus tremuloides</i>	19/4	2L	<i>Rhus typhina</i>	23/6	IE
<i>Ulmus americana</i>	22/4	3E	<i>Phleum pratense</i>	24/6	IE
<i>Acer negundo</i>	1/5	2L	<i>Bromus inermis</i>	25/6	6L
<i>Acer saccharum</i>	6/5	2E	<i>Catalpa speciosa</i>	12/7	1IL
<i>Prunus pensylvanica</i>	15/5	2L	<i>Tilia americana</i>	12/7	5L
<i>Smilacina stellata</i>	19/5	IE	<i>Cephalanthus occidentalis</i>	20/7	5L
<i>Pinus sylvestris</i>	23/5	5E	<i>Cassia hebecarpa</i>	30/7	3E
<i>Anemone canadensis</i>	3/6	N	<i>Solidago canadensis</i>	3/8	2L
<i>Carya cordiformis</i>	12/6	IE	<i>Hamamelis virginiana</i>	14/9	9E

SUMMARY OF PHENOLOGICAL DATA TAKEN AT  
WINNIPEG, SASKATOON, AND EDMONTON IN 1954

<u>Species</u>	<u>Winnipeg</u>		<u>Saskatoon</u>		<u>Edmonton</u>	
<i>Corylus rostrata</i>	--	--	--	--	7/5	9L
<i>Shepherdia canadensis</i>	--	--	--	--	17/5	7L
<i>Pulsatilla ludoviciana</i>	--	--	3/5	15L	18/5	13L
<i>Populus tremuloides</i>	8/5	12L	6/5	11L	14/5	18L
<i>Phlox hoodii</i>	--	--	16/5	18L	--	--
<i>Salix petiolaris</i>	--	--	19/5	13L	17/5	6L
<i>Acer negundo</i>	17/5	11L	19/5	12L	7/5	4L
<i>Betula papyrifera</i>	--	--	24/5	14L	7/5	1E
<i>Thermopsis rhombifolia</i>	-	--	19/5	8L	--	--
<i>Amelanchier alnifolia</i>	30/5	12L	27/5	13L	31/5	15L
<i>Prunus americana</i>	23/5	10L	--	--	--	--
<i>Hierochloë odorata</i>	4/6	12L	9/6	21L	--	--
<i>Prunus pensylvanica</i>	--	--	1/6	13L	28/5	10L
<i>Viola rugulosa</i>	--	--	1/6	11L	3/6	11L
<i>Smilacina stellata</i>	3/6	10L	1/6	8L	26/5	1E
<i>Crataegus chrysocarpa</i>	6/6	14L	12/6	15L	18/6	18L
<i>Prunus melanocarpa</i>	9/6	15L	15/6	18L	14/6	17L
<i>Viburnum lentago</i>	15/6	12L	--	--	--	--
<i>Cornus stolonifera</i>	14/6	14L	15/6	16L	15/6	13L
<i>Hedysarum americanum</i>	--	--	17/6	9L	--	--
<i>Elaeagnus commutata</i>	--	--	21/6	17/6	21/6	16L
<i>Lonicera glaucescens</i>	--	--	22/6	14L	18/6	10L
<i>Thalictrum turneri</i>	--	--	--	--	15/6	9L
<i>Viburnum trilobum</i>	18/6	9L	--	--	--	--
<i>Viburnum pubescens</i>	19/6	10L	--	--	--	--
<i>Anemone canadensis</i>	15/6	9L	22/6	11L	--	--
<i>Achillea lanulosa</i>	--	--	22/6	12L	--	--
<i>Maianthemum canadense</i>	--	--	--	--	13/6	6L
<i>Galium boreale</i>	--	--	1/7	16L	3/7	9L
<i>Bromus inermis</i>	4/7	13L	6/7	11L	16/7	18L
<i>Rosa alcea</i>	--	--	7/7	17L	24/6	7L
<i>Gaillardia aristata</i>	--	--	6/7	12L	--	--
<i>Chrysopsis hirsutissima</i>	--	--	11/7	10L	--	--
<i>Spiraea alba</i>	--	--	8/7	6L	5/7	N
<i>Symphoricarpos occidentalis</i>	15/7	18L	12/7	7L	--	--
<i>Campanula petiolata</i>	--	--	7/7	11L	19/7	6L
<i>Phleum pratense</i>	--	--	--	--	13/7	6L
<i>Cirsium flodmanii</i>	--	--	18/7	3L	--	--
<i>Lactuca pulchella</i>	--	--	18/7	9L	--	--
<i>Chamaenerion spicatum</i>	--	--	18/7	11L	11/7	2L
<i>Agastache anethiodora</i>	--	--	--	--	2/8	20L
<i>Apocynum androsaemifolium</i>	--	--	--	--	30/7	11L
<i>Solidago missouriensis</i>	--	--	23/7	8L	--	--
<i>Solidago canadensis</i>	19/7	1L	--	--	6/8	16L



<u>Species</u>		<u>Winnipeg</u>		<u>Saskatoon</u>		<u>Edmonton</u>	
Grindelia perennis		--	--	31/7	7L	--	--
Aster conspicuus		--	--	--	--	29/7	4L
Oligoneuron canescens		--	--	6/8	11L	--	--
Aster ericoides		--	--	8/8	9L	--	--
Aster laevis		--	--	11/8	12L	12/8	12L
Wheat -							
	Sown	20/4	6E	10/5	10L	5/5	6L
	Emerged	15/5	8L	26/5	14L	14/5	4L
	Headed	10/7	12L	17/7	15L	--	--
	Ripe	20/8	13L	19/8	9L	7/9	21L

## I. DISEASES OF CEREAL CROPS

### WHEAT

EYE SPOT (Cercospora herpotrichoides) was found just before harvest causing damage in a few widely separated fields of Cornell 595 and Genesee winter wheat in Kent Co., Ont. The affected plants occurred in patches up to 10 ft. in diameter. The culms on such plants were weak and small, often bent at the nodes, sometimes almost at right angles, and bore smallish heads. Although the crop rotation practised in these fields was not ascertained wheat is commonly grown in the same field for 2 successive years. Rotations on these sandy loam soils are short, wheat often alternating with corn or soybeans; clover is rarely sown down with the wheat (W.G. Benedict). Shoemaker and Tyler (Plant Dis. Repr. 38 (10):710. 1954) have reported eye spot to be quite widespread in New York State. The disease was first found in Ont. in 1949 (P. D. S. 39:1) (I. L. C.).

ERGOT (Claviceps purpurea) affected volunteer rye in a field of winter wheat at Creston, B. C.; the ergot bodies would probably be noticeable in the threshed wheat (J.S. Horricks). Head infection was 8-tr., 1-2%, 1-5%/626 fields of spring wheat examined in Alta.; none was found in the Peace River area (W. P. C., J. S. H.). (cf. Ergot Survey) Ergot affected 1% of the heads of Thatcher wheat in the co-operative seed treatment trials at Ste Anne de la Pocatiere, Que. (R.O. Lachance). A few ergots were present in a sample of wheat brought in by a poultryman at Charlottetown, P. E. I. (R. R. Hurst).

ANTHRACNOSE (Colletotrichum graminicola) affected 28% of the plants in a block of Richmond winter wheat in the plots at Ottawa, Ont.; damage was tr. -sl. (R. V. Clark).

The root-inhabiting fungus, Cryptoascus graminis Robinson & Ayers (Can. J. Bot. 32:543-544. 1954) was found on the roots of 1% of the plants in a field of Cornell 595 affected by a root rot in Kent Co., Ont. The fungus was frequently parasitizing the roots of wheat plants grown in the greenhouse in soil from a wheat field affected by the root-rot complex (see under Rhizoctonia solani) (W.G. Benedict). This root parasite was first observed in P. E. I. in 1936 (P. D. S. 16:6) and was tentatively identified as an undescribed species of Cryptoascus in 1937 (P. D. S. 17:5-6). It has not previously been reported elsewhere in Canada (I. L. C.). A trace was found on the roots of Acadia in a field at Covehead, P. E. I. (R. R. Hurst).

POWDERY MILDEW (Erysiphe graminis). Infection was 2-tr. 1-sl./8 fields of spring wheat examined at Creston, B. C. (J.S. Horricks). On winter wheat in s. Alta., infection was 26-tr. 3-sl./37 fields (J. S. H.) and on spring wheat in Alta. the ratings were 44-tr. 17-sl. 3-mod.



3-sev./626 fields examined. Most infected fields were in s. Alta. with a few in the Peace River area (W. P. C., J. S. H.) (see also Rust Nurseries).

Powdery mildew was present in the plots at Ottawa, Ont. On spring wheat, infection was fairly heavy on Acadia, mod. on Cascade, and mod. but patchy on Coronation; on the winter variety Richmond infection was sl. -sev. (R. V. Clark).

HEAD BLIGHT (Fusarium spp.). Tr. infections were noted in two fields, at Chamberlain and Canwood, out of 251 fields examined in Sask. (H. W. M.). Isolations made from 4 samples yielded the following species: spring wheat-Nipawin, Sask., (tr. infection) F. avenaceum; Winnipeg, Man., (tr.) F. culmorum; (tr.) F. avenaceum; winter wheat - Sanford, Ont. (mod.) F. culmorum (W. L. Gordon). Head blight affected tr. -25%, av. 10%, of the heads of spring wheat in one variety trial and tr. -5%, av. 2% in another at Ste Anne de la Pocatiere, Que. (L. J. Coulombe). Head blight affected 50-75% of the heads in blocks of Cascade, Acadia and Coronation wheat at Ottawa, Ont. Helminthosporium sativum appeared to be the predominant pathogen (R. V. Clark).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Damage was 8-tr. 2-sl./12 fields of winter wheat and 3-tr. 5-sl./8 fields of spring wheat examined about Creston, B. C. (J. S. Horricks). Damage was 12-tr. 18-sl. 6-mod. /37 fields of winter wheat, all in s. Alta. (J. S. H.) and 227-tr. 276-sl. 48-mod. 7-sev./626 fields of spring wheat examined in Alta.; the disease was general throughout the province, but the damage was not great (W. P. C., J. S. H.).

Common root rot appeared early in Sask. in 1954. In most parts of the province the percentage of plants bearing conspicuous lesions was relatively high, infection ranging from 30 to 70% by the time the plants were in the late seedling stage. This high figure indicates that an abundance of inoculum was present and that on account of the late date at which much of the crop was sown the soil was relatively warm during the seedling stages, a condition favourable for infection. The disease, however, became less prevalent as the season advanced and wet weather set in. Between the time of seedling infection and of the crop flowering, there was a general reduction in the severity of infection. The reduction resulted from the death and partial decay of infected tissue such as the coleoptile and lower leaf sheaths. Some infection still was present during the late season on the longer-lived parts of the plants. From data collected from 130 fields visited after the crop had reached the soft dough stage there was obtained for the province an average disease rating of 9.44, which is a lower figure than the 12.22 recorded for 1953. The ratings for crop districts 1, 2, 5, 6, 7, and 8 were 9.3, 9.1, 11.5, 6.2 and 6.6 respectively. The data obtained in the other three districts were inadequate for computing reliable ratings. The prematurity blight phase of common root rot was evident in 25 out of 120 fields visited at a time when it should be observable. In 14 fields 1-5% of the plants were affected; in the other 9, less than 1% showed symptoms. Specimens

showing symptoms of prematurity blight were also received from five places in Sask. (B. J. Sallans). Common root rot was sev. on wheat seedlings received from Birch Hills on July 7; the disease was present on more mature plants from Lucky Lake and from 2 fields near Prince Albert (T. C. Vanterpool).

KERNEL SMUDGE (Helminthosporium sativum and Alternaria tenuis) sev. discoloured a sample of Selkirk wheat from Stonewall, Man. (J. E. Machacek).

LEAF BLOTCH (Helminthosporium tritici-repentis). Infection was 2-tr. 45-sl. 3-mod./251 fields examined in Sask. The disease was present in all zones and was epidemic when the crop was at the third to fourth leaf stage; it then disappeared as the weather turned drier (H. W. Mead). The perfect state (Pyrenophora tritici-repentis) was found on stubble at Sutherland and LaPorte (T. C. Vanterpool).

ROOT ROT (Lagena radiculicola). In June, during heavy rain, when the fields were muddy, a bucketful of soil was collected from the edges of 4 summer fallow fields on Regina clay, 3-12 mi. n. of Regina, Sask. After the soil was brought to the greenhouse, it was sown to wheat and kept quite moist; Lagena radiculicola developed abundantly in the fine roots of the plants. From the studies made by Vanterpool and Ledingham (Can. J. Research 2:171-194. 1930) it seems highly probable that the fungus still causes sl. damage in wet years to wheat on the heavy soils of the Regina plains (T. C. Vanterpool).

TAKE-ALL (Ophiobolus graminis). Damage was 5-tr. 3-sl./12 fields of winter wheat and 1-tr./8 fields of spring wheat examined about Creston, B. C. (J. S. Horricks). Take-all damage was 3-tr. 1-sl./37 fields of winter wheat in s. Alta. (J. S. H.) and 43-tr. 42-sl. 15-mod. 4-sev./626 fields of spring wheat examined in Alta. The disease was generally scattered through the province, but the most sev. damage occurred on the black soil e. of Edmonton (W. P. C., J. S. H.). Out of 251 fields examined in Sask., 8 were found affected in central and e.-central Sask.; damage was 3-tr. 5-sl. (H. W. M.). Affected specimens were received from Nokomis and Prince Albert (T. C. Vanterpool). A tr. infection was found in a small field at Mavillette, Digby Co., N. S.; perithecia were numerous on the crown and culms of the infected plants. First record for N. S. (K. A. Harrison, D. W. Creelman).

BASAL GLUME ROT (Pseudomonas atrofaciens). Infection was 3-tr. and 1-mod. in the 4 fields found affected in central Alta. (W. P. C.). Tr.-sl. infections were observed in 13 fields mostly located between Saskatoon and Regina (H. W. Mead).

STRIPE RUST (Puccinia glumarum). Infection was 1-tr. 5-sl. 1-mod. 5-sev. /12 fields of winter wheat and 1-tr. 1-sl. 1-mod. 5-sev./8



fields of spring wheat about Creston, B. C. (J. S. Horricks).

**STEM RUST** (*Puccinia graminis*). The rust epidemic in Western Canada in 1954 is fully described in a special section under Rust Nurseries (q. v.). Only a few additional notes are included here.

Infection was 18-tr. 3-sl. on winter wheat in s. Alta. (J. S. H.). Stem rust on spring wheat was observed only once, in the Prince River district, at Whitelaw. Elsewhere in Alta., stem rust was general; it caused heavy damage about Drumheller and in an area enclosed by the Sask. boundary and a line passing through Chauvin, Vegreville, St. Paul and Lloydminster (W. P. C., J. S. H.). Stem rust was found to be general on barley in the increase plots at Saskatoon, Sask., on 22 June by Dalton Wong and myself. Next day it was found on wheat at Saskatoon by myself and in every wheat field in the district by B. J. Sallans. These reports made at least a month before the average appearance of stem rust are believed to be the earliest records for the district. Leaf rust was, of course, also observed on wheat wherever stem rust was found. (T. C. Vanterpool). Stem rust infection was recorded in the plots at Ottawa as follows: spring wheat - Coronation tr.; Cascade 10% and Acadia 75%, and winter wheat - Richmond 10% (R. V. Clark). Infections up to 25% were observed in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe) and up to 10% in the plots at Fredericton, N. B. (J. L. Howatt). A tr. was found in field of mixed wheat at Stanhope, P. E. I. (R. R. Hurst).

**LEAF RUST** (*Puccinia triticina*) was also epidemic in Western Canada in 1954 (see Rust Nurseries). Traces were observed in 7 out of 12 winter wheat fields about Creston, B. C., and in 12/37 in s. Alta. (J. S. Horricks). Infection was 100-tr. 141-sl. 69-mod. 27-sev./626 fields of spring wheat in Alta. Leaf rust was widespread and was noted as far to the northwest as 16 mi. n. of Fort St. John, B. C. (W. P. C., J. S. H.). Leaf rust infections ranged from 25 to 50% in the plots at Ottawa, Ont. (R. V. Clark) and mostly from 20 to 50% in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe). Leaf rust was generally light at the Station, Fredericton, N. B. (J. L. Howatt). Heavily rusted specimens were brought in from Mt. Herbert, P. E. I. (R. R. Hurst).

**BROWNING ROOT ROT** (*Pythium* spp.) was reported from Eaglesham and Drumheller, Alta. (A. W. Henry). The disease was found affecting wheat seedlings received from Sceptre, Sask. (H. A. H. Wallace). Plants in the late seedling stage received from Prince Albert were severely affected by root rot caused by *Pythium* and *Helminthosporium-Fusarium*. Roots were cream-coloured instead of white and in a second sample *Ophiobolus* was present. According to the Agricultural representative the crop looked poor (T. C. Vanterpool). A mod. infection was observed at Swan River, Man. (J. E. Machacek).

ROOT ROT (Rhizoctonia solani, Pratylenchus minyus, etc.) caused mod. -sev. damage in 65 out of 236 fields, mostly of Cornell 595, examined in Kent Co., Ont. The disease was only slightly less prevalent than in 1953 (P. D. S. 33:4-5) (W. G. Benedict).

GLUME BLOTCH (Septoria nodorum). Traces were recorded in 3 fields of winter wheat and a sl. infection in one of spring wheat about Creston, B. C. (J. S. Horricks). Only traces were observed in 3 fields of winter wheat and 4 of spring wheat in s. Alta. (J. S. H.). In the rest of Alta. the infection was 50-tr. 170-sl. 104-mod. 25-sev. (W. P. C.). Affected specimens were received from Prince Albert, Sask. (T. C. V.). No other observations seemed to have been made in the Prairie Provinces (I. L. C.). Infection was heavy in the cereal plots at Charlottetown, P. E. I., on Acadia. Mature pycnidia were present on the glumes (J. E. Campbell).

SPECKLED LEAF BLOTCH (Septoria spp.). Infection was 4-tr. 7-sl. /12 fields of winter wheat and 3-tr. 1-sl. /8 fields of spring wheat examined about Creston, B. C. (J. S. H.). Infection was 15-tr. 3-sl. /37 fields of winter wheat in s. Alta. and 42-tr. 229-sl. 131-mod. 99-sev. /626 fields of spring wheat in Alta. The disease was most severe in the mature crops at the time of examination. No attempt was made to determine the species of Septoria present (W. P. C., J. S. H.). Infection by S. avenae var. triticea was a trace in one and mod. in a second field in the Regina area of Sask. (H. W. Mead). Diseased specimens were received from Viscount (T. C. Vanterpool). Trace to light infections were found in the plots at Ottawa, Ont. on Richmond winter wheat and Cascade, Acadia and Cornation spring wheat (R. V. Clark). Infection was 5-45% in the wheat plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe).

COMMON BUNT (Tilletia caries and T. foetida). The date obtained from the records of the Board of Grain Commissioners for the current year is presented in Table 1. There appears to be a very slight drop in the percentage of cars graded smutty in the past year (W. Popp).

Table 1. Common Bunt in Wheat in Western Canada

Class of Wheat	Aug. 1, 1953 to July 31, 1954			Aug. 1 to Oct. 31, 1954		
	Cars Inspected	Cars	Percentage	Cars Inspected	Cars	Percentage
		Graded Smutty	Graded Smutty		Graded Smutty	Graded Smutty
Hard Red Spring	188,222	233	0.12	35,713	30	0.08
Amber Durum	4,420	6	0.14	781	2	0.26
White Spring	219	1	0.46	65	0	0.00
Alta. Red Winter	205	9	4.39	232	5	2.15
Garnet	1,525	1	0.06	898	0	0.00
Mixed Wheat	156	0	0.00	63	0	0.00
All classes	194,747	250	0.13	37,752	37	0.10



A trace of bunt was found in 2 out of the 12 fields of winter wheat examined about Creston, B. C. (J. S. Horricks). A trace of bunt was found in 4/37 fields of winter wheat in s. Alta. (J. S. H.) and in 1/626 fields of spring wheat in Alta. The affected field was at Notikewin (W. P. C.). Traces of bunt were recorded in 13/186 fields in Sask. It was as usual rather scarce. (R. C. Russell). A trace of bunt was observed in one field out of 115 examined in Man. although some fields were too young for diagnosis of the disease (W. Popp).

DWARF BUNT (Tilletia contraversa or T. brevifaciens). Traces were found in 4/12 fields of winter wheat examined about Creston, B. C. (J. S. Horricks); the diagnosis was confirmed from a specimen from one field sent to Ottawa (I. L. C.).

A field survey for dwarf bunt in Ont. was again undertaken in 1954. To secure more complete coverage of the province, S. G. Fushtey and L. V. Busch surveyed the s. w. counties and I. L. Connors and A. J. Skolko the central and e. counties. Of the 400 fields examined, common bunt (T. foetida) was found in 50, dwarf bunt in 25, and both species in four. As a result of two years' observations it appears that dwarf bunt is most prevalent in the winter wheat areas in Bruce, Grey, Dufferin and Simcoe counties. It is well established in Huron and occurs in Middlesex and York. It is also known from single fields in Brant, Perth, and Victoria counties. Dwarf bunt appeared to be slightly less prevalent this year than in 1953 (I. L. Connors, S. G. Fushtey).

With a view to ascertaining what species of smut caused the "low" smut reported in Michigan in 1892 and again in 1918 the herbarium of the Michigan State College was visited in November. As a result of examination of specimens made then and after my return to Ottawa, it may be stated that dwarf bunt was present in Michigan as early as 1890. It may be noticed that the account of "low" smut given by Mr. Enos Holmes of Buchanan, Mich., and published by P. M. Harwood (Mich. Agr. Exp. Sta. Bull. 87. 1892) describes the appearance and distribution of dwarf bunt in the field as we know it to-day in Ont. Although no specimens with which Pötte and Coons (Phytopathology 8:106-113. 1918) had worked were located, a specimen collected at New Carlisle, Indiana, July 1917 and preserved in the herbarium of Purdue Univ. Agr. Exp. Station proved to be dwarf bunt. It seems possible that dwarf bunt may have been present in eastern North America for a long time. If this deduction is correct it is essential to determine whether dwarf bunt is now becoming worse than formerly because the present varieties are more susceptible or the use of the combine-harvester and other changes in wheat culture particularly favour the organism. It is hoped to publish a further account of these observations (I. L. Connors).

LOOSE SMUT (Ustilago tritici). Infection in spring wheat was 2-tr. /8 fields about Creston, B. C. (J. S. H.) and 5-tr. 2-1 % /626 fields in Alta. (W. P. C., J. S. H.). In Sask. loose smut was seldom seen except

in Lee or durum wheat; it was recorded in 6/186 fields; av. infection was tr. - (R. C. Russell). In Man., loose smut is rapidly increasing in Lee, in some fields of which 12 % of the heads were affected in 1954, compared with 5 % in 1953 and 3.5 % in 1952. The av. infection in 115 fields of wheat was 1.3 % (W. Popp). Loose smut affected 1.5 % of the heads in a field at the Station, Ste Anne de la Pocatiere, Que.; the seed had been treated by the hot water method (R. O. Lachance).

BLACK CHAFF (Xanthomonas translucens). Diseased specimens were received from Livelong and Prince Albert, Sask. (T. C. Vanterpool).

STREAK MOSAIC (virus) was more prevalent than in the previous 2 years in s. Alta. in areas where winter wheat is grown extensively. Infection in winter wheat surveyed in May and June was 36-tr. 19-sl. 38-mod. 29-sev. /124 fields and in spring wheat examined in June and early July it was 10-tr. 4-sl. 4-mod. 7-sev. /34 fields. Losses in yield were substantial in all fields where the disease was recorded as mod. or sev.; 18 of the sev. diseased crops observed were worked up in the spring and the fields summerfallowed or sown to a spring grain. Several other abandoned crops were reported by district representatives and farmers. The later surveys showed that mosaic was also a serious problem in spring wheat that was grown close to diseased winter wheat.

The sev. and widespread incidence of wheat streak mosaic in the 1953-54 winter wheat crop is attributed to several factors that favoured the multiplication and spread of the virus and its vector, Aceria tulipae. Many spring wheat crops were late maturing in 1953 and while they were still immature provided a source of infection for winter wheat sown in adjacent fields. Also many fields harboured volunteer wheat that was not eliminated before winter wheat was sown in the same or adjacent fields. These immature plants afforded excellent breeding grounds for the vector as well as the virus. Unusually warm weather during September and October favoured spread of the disease to and its increase on winter wheat.

Although I was unable to inspect personally the limited winter wheat acreage near Shaunavon in s. w. Sask., Dr. J. E. Andrews of Lethbridge accompanied by Mr. S. McBean of Swift Current did examine a number of fields. They found streak mosaic in one field where it was causing mod. -sev. damage. From samples brought to Lethbridge the diagnosis was confirmed (J. T. Slykhuis).

POOR EMERGENCE (? chemical injury). A field of spring wheat was observed at Strathmore where emergence was very poor. When the grain was dug up the kernels bore extremely thickened sprouts 1/2-1 in. long and up 1/4 in. in diameter. The seed had been treated with Mergamma C. When the same wheat was treated with Ceresan M there was a good stand of normal seedlings. It would appear that damage was caused in some way by the Mergamma (W. P. Campbell).



## OATS

ERGOT (Claviceps purpurea) was found in 4 numbered varieties under test at St. Charles de Caplan, Que. (D. Leblond).

ROOT ROT (Fusarium spp.). Damage was 1-sl./6 fields examined about Creston, B.C., and 9-tr. 4-sl./302 fields in Alta. (J.S. Horricks, W.P. Campbell).

LEAF BLOTCH (Helminthosporium avenae). Infection was 1-tr. 2-sl./6 fields examined about Creston, B.C., and 6-tr. 10-sl./302 fields in Alta.; all but one field was in s. Alta. (J.S.H., W.P.C.). A sl. infection was observed on a block of Abegweit at Ottawa, Ont. (R.V. Clarke) and on a field of the same variety at North Lake, Kings Co., P.E.I. (J.E. Campbell). Infection was tr.-sl. in the plots at Ste Anne de la Pocatiere, Que. (L.J. Coulombe).

Seedling blight was sev. in a field of Cartier at North River, Queens Co., P.E.I., on 17 June. The affected seedlings formed yellow patches in the field. The seed was not treated (J.E. Campbell). Although an *Alternaria* was isolated from the seed, it is unlikely that it was the primary pathogen (I.L.C.).

HALO BLIGHT (Pseudomonas coronafaciens). Infection was 80-tr. 101-sl. 34-mod. 6-sev./302 fields examined in Alta.; most sev. affected fields were in central Alta., where the rainfall was very heavy (W.P.C., J.S.H.). A sl. infection was found in 5 out of 6 fields examined in Man. (W.A.F. Hagborg). Halo blight was fairly prevalent on blocks of Abegweit and Beaver at Ottawa, Ont. (R.V. Clark).

STRIPE BLIGHT (Pseudomonas striafaciens) infected a few plants of Abegweit and 10% of the Barner in blocks at Ottawa, Ont. (R.V. Clark).

CROWN RUST (Puccinia coronata). For its occurrence in Western Canada see under Rust Nurseries. Infection was 50-tr. 53-sl. 27-mod. 3-sev./302 fields in Alta.; the affected fields were mostly in e. central Alta. (W.P.C.).

A sl. infection was noted in a field at St. Catharines, Ont. (T.R.D.). A 10% infection was recorded on Abegweit and 50% on Beaver at Ottawa (R.V. Clark). Crown rust was extremely heavy on oats forming a border about a 5-acre field of gladiolus at Bethany, Shefford Co., Que. An adjacent field of oats was likewise heavily rusted. Stem rust was also present (J.A. Parmelee). Infection ranged up to 75% in the plots at Ste Anne de la Pocatiere; very few of the lines under test showed marked resistance to crown rust (L.J. Coulombe). A mod. infection was also noted at St. Gedeon, Lake St. John Co. (D. Leblond). Little rust was observed at Fredericton, N.B., except in fields sown late (J.L. Howatt).

Only tr. infections were recorded at Kentville, N.S.; up to 5% of rust was noted in fields near Bridgewater, Lunenburg Co. (D. W. Creelman). Crown rust was mod. on oats about Charlottetown, P.E.I., apparently being somewhat heavier than usual; infection on the buckthorn was very light (J. E. Campbell).

Phanerogamic specimens of several oat species were collected 13 Oct. 1953 from the Forage Plants nursery at Ottawa, Ont., by L. Jenkins. After the specimens were identified by D. R. Lindsay, the rust infection on each collection was estimated as follows: Crown rust - Avena brevis 1927-5628 and 1927-5785, nil; A. longiglumis 1927-5514, tr.; A. sativa v. orientalis 1927-5630, light; A. sterilis ssp. trichophylla 1927-5639, nil; A. strigosa 1927-5631, mod.; 1927-5640, heavy; and 1927-5768, mod.-heavy. Stem rust - A. brevis, mod.-heavy and heavy; A. longiglumis, light; A. sativa v. orientalis mod.; A. sterilis ssp. trichophylla, light; and A. strigosa, mod. (D. B. O. Savile).

STEM RUST (Puccinia graminis). The epidemic in Western Canada is described under Rust Nurseries. Infection was 56-tr. 46-sl. 37-mod. 20-sev./302 fields; the affected fields were mostly in e. - central Alta. Stem rust was also widespread on wild oats (Avena fatua) in the same area and often very severe, attacking even the pedicels and glumes (W. P. Campbell, J. S. Horricks).

Stem rust infections up to 65% (Ajax) were observed in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe). Stem rust caused some loss of yield at Woodstock, N.B., where much of the crop was sown late (S. R. Colpitts). Infection was a trace up to 10% (Ajax) in the plots at the Fredericton Station (J. L. Howatt). A 30% infection was recorded near Bridgewater, N.S. (D. W. Creelman).

SPECKLED LEAF BLOTCH (Septoria avenae). Infection was 17-tr. 109-sl. 41-mod. 5-sev./302 fields examined in Alta. (W. P. C.). A light infection was reported at Melville and Jansen, Sask. (H. W. Mead). The disease was heavy on leaves of Beaver and much lighter on Abegweit in blocks of these varieties at Ottawa, Ont. (R. V. Clark). In the variety test at Ste Anne de la Pocatiere, Que., infection ranged from 15 to 70% (L. J. Coulombe). Infection was also sev. in a field of Beaver at the Station (H. Genereux) and at St. Charles de Caplan (D. Leblond). Speckled leaf blotch was sev. in some varieties under test at the Station, Fredericton, N.B. The glumes were also often frequently attacked. In sev. affected varieties, the culms were injured, causing the crop to lodge (J. L. Howatt). The disease caused mod. damage to a field at Berwick, N.S. (D. W. Creelman). Speckled leaf blotch was general in P.E.I., causing rot of the culms especially of Abegweit. The foundation seed plot of this variety at the Station, Charlottetown, was heavily infected; about 80% stem infection and 15% stem break were recorded (J. E. Campbell).



SMUTS (Loose Smut, Ustilago avenae and Covered Smut, U. kolleri) infected 58/302 fields examined in Alta.; infection was tr. -30% av. 1.1% in fields examined (W. P. C., J. S. H.). Covered smut was found in 13/29 fields examined in Sask. causing an av. infection of about 2%. No loose smut was observed this year (R. C. Russell). In the 74 fields of oats examined in Man. loose smut infection was 0-6%, av. 0.3% and that of covered smut 0-20%, av. 0.6%, an average of 0.9% for the two smuts. The oat smuts have not been very prevalent in recent years except for a heavy infection in an occasional field (W. Popp). Loose smut infection was 1-10% and that of covered smut 5-15% in the fields examined in Kamouraska Co., Que. Some smut, particularly loose smut, was present in every field, but covered smut when present was more prevalent than usual (R. O. Lachance). A crop of Banner in Chicoutimi Co. from well-cleaned seed grown on the farm but not treated showed 20% loose smut (L. J. Coulombe). A tr. of loose smut was noted in Ajax and Erban at Grand Falls, N. B. (S. R. Colpitts).

RED LEAF (virus). What is believed to be red leaf affected a few plants of Abegweit and Beaver in blocks of these varieties at Ottawa, Ont. (R. V. Clark).

STREAK MOSAIC (virus). A trace was found in one field of oats in s. Alta. (J. S. Horricks).

BLAST (non-parasitic). Damage was 5-sl./6 fields about Creston, B. C. and 75-tr. 87-sl. 57-mod. 26-sev./302 fields examined in Alta. Wherever the varieties were identified, blast was most sev. in Victory (W. P. C., J. S. H.). Blast was only noted in 3 out of 29 fields examined in Sask.; in general oats made good growth and in consequence damage from blast was sl. (H. W. Mead). Blast caused in general little damage to the varieties under test at Ste Anne de la Pocatiere, Que.; the highest percentage was 13.4 in Victory (L. J. Coulombe).

BLACKBIRD INJURY. Examples of injury were received from 4 places in Sask. Its relative prevalence on oats this year suggests that the natural food of the blackbird may have been scarce; native fruits matured late and insects were scarce. The blackbirds squeeze the oats between their bills when the grains are in the milk. Sterility results. Beak marks may be observed diagonally or horizontally across the glumes (T. C. Vanterpool).

#### BARLEY

ERGOT (Claviceps purpurea). A sl. infection was found in 14/351 fields examined in Alta.; one affected field was in the Peace River area and the others in e.-central Alta. (W. P. C.). See also Ergot Survey for occurrence in Sask. and Man.

POWDERY MILDEW (Erysiphe graminis). A sl. infection was seen in one field near Fort St. John, B. C. (W. P. C.). Traces were observed in the Station plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe) and Charlottetown, P. E. I. (R. R. Hurst).

A new feed barley named Brant developed at the Ontario Agricultural College, Guelph, has out yielded all named varieties in a uniform test of 25 barley varieties conducted by the Cereal Division during 1954 at 14 points in Eastern Canada. The new variety is resistant to powdery mildew (D. G. Hamilton).

HEAD BLIGHT (Fusarium spp.). Affected heads were received from Hirschel, Sask. (T. C. Vanterpool). Up to 12% of the heads were affected in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe).

STRIPE (Helminthosporium gramineum). Infection was 7-tr. 28-sl. 14-mod. 2-sev./351 fields examined; most of the affected crops were in central Alta. (W. P. C., J. S. H.). A tr. of stripe was seen in one field at Yorkton, Sask. (H. W. Mead).

SPOT BLOTCH (Helminthosporium sativum). Infection was 1-tr. 1-sl./3 fields about Creston, B. C. Spot blotch was only observed in s. Alta.; infection was 6-tr. and 1-sl. (J. S. Horricks). Spot blotch was reported by Dr. D. G. Hamilton to be generally heavy on barley in the Ottawa district. In the samples submitted the straws were bent at the nodes and the nodes were dark coloured and frequently decayed. (Mary E. Elliott).

HEAD BLIGHT (Helminthosporium sativum) was unusually prevalent in the Lacombe area, Alta.; infection was 25-tr. 37-sl. 7-mod./351 fields examined (W. P. C., J. S. H.). Affected plants were received from Cupar, Sask. (T. C. Vanterpool).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Damage was sl. in the 3 fields examined about Creston, B. C. (J. S. Horricks). Common root rot was general throughout Alta., damage being 67-tr. 153-sl. 46-mod. 10-sev./351 fields examined (W. P. C., J. S. H.). In Sask. infection was 2-sl. 12-mod. 3-sev./17 fields examined; the av. disease rating was 16.4, compared with 18.8 in 1953 (B. J. Sallans).

NET BLOTCH (Helminthosporium teres) was most serious in Alta. in the black soil areas particularly about Lacombe. Infection was 28-tr. 128-sl. 68-mod. 41-sev./351 fields examined in Alta. (W. P. C., J. S. H.). About Creston, B. C., infection was 1-tr. 1-sl./3 fields examined (J. S. Horricks). Net blotch occurred in all barley areas in Sask.; infection was 10-sl. 1-mod. 1-sev./24 fields examined (H. W. Mead). Net blotch was unusually sev. and widespread by the end of June in barley fields about Saskatoon (T. C. Vanterpool). In Man. in one



survey, infection was 1-tr. 1-sl. 5-mod. 2-sev. /37 fields examined (G. J. Green); in another net blotch infected a tr. to 2% of the leaf area in 8 out of 11 fields examined (W. A. F. Hagborg). Net blotch was fairly heavy in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe) and at St. Charles de Caplan (D. Leblond). A 50% infection was noted on Fort barley in a field at the Normandin Station (H. Genereux). Net blotch was general in P. E. I. in 1954 (J. F. Campbell).

TAKE-ALL (Ophiobolus graminis). Most of the affected fields observed were in the area about Fort St. John and Dawson Creek, B. C.; damage was tr. -sl. (W. P. Campbell).

STRIPE RUST (Puccinia glumarum). A tr. infection was found in one field in s. Alta. (J. S. H.).

STEM RUST (Puccinia graminis) infection was 25-tr. 12-sl. 11-mod. and 2-sev. in the fields found affected in Alta.; these fields were all s. and e. of Edmonton extending s. to the international boundary (W. P. C., J. S. H.). In Sask. stem rust infection was much less severe on barley than on wheat. In general losses were sl. but occasionally they were mod. (H. W. M.). As already noted under wheat, stem rust was found on Hannchen and other barley varieties in the plots at Saskatoon on 22 June. This appears to be the earliest date on record of the appearance of stem rust in this district (T. C. Vanterpool). Only a tr. of rust was noted on barley at Ste Anne de la Pocatiere, Que. (L. J. Coulombe). The 1954 epidemic in Western Canada and the occurrence of stem rust in Eastern Canada are discussed more fully under Rust Nurseries.

LEAF RUST (Puccinia hordei). Traces of leaf rust were observed in 2 fields in s. Alta. (J. S. H.). Sl. infections were recorded in 4 fields in Sask. (H. W. M.). Only a trace was found on two varieties in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe). A mod. infection was recorded at St. Urbain, Charlevoix Co. (D. Leblond). Leaf rust was prevalent this year on barley varieties at the Station, Fredericton, N. B.; infection was 5-80% (J. L. Howatt). Leaf rust was heavy on Charlottetown 80 in a field near Charlottetown, P. E. I. (R. R. Hurst).

SCALD (Rhynchosporium secalis). Infection was 30-tr. 53-sl. 33-mod. 35-sev. /351 fields examined in Alta.; the disease was most sev. in the Lacombe area (W. P. C., J. S. H.). Out of the 24 fields observed, infection was a tr. in a field at Birch Hills and sl. in one at Stewart Valley, Sask. (H. W. M.). Infection was 3-tr. 1-sl. 1-mod. 1-sev. /37 fields examined in Man. (G. J. Green). A 40% infection was observed on Sanalta barley in the plots of the co-operative seed treatment trials at Ste Anne de la Pocatiere, Que. (R. O. Lachance).

**SPECKLED LEAF BLOTCH** (Septoria passerinii). Infection was 12-tr. 87-sl. 103-mod. 75-sev./351 fields in Alta.; most of the affected fields were in central Alta. and the Peace River District (W. P. C., J. S. H.). Infection was sl. in 3 and mod. in 2 in s. -central Sask. out of 24 fields examined (H. W. M.). Infection was 4-tr. 1-sl. 9-mod. 9-sev./37 fields examined in Man. (G. J. Green). The disease was mod. to heavy in the plots at Ste Anne de la Pocatiere, Que. (L. J. Coulombe).

**COVERED SMUT** (Ustilago hordei) was found in 34/351 fields in Alta.; infection was tr. -5%, av. tr. in the fields examined (W. P. C., J. S. H.). A tr. was found in 1/3 fields about Creston, B. C. (J. S. H.). Covered smut was recorded in 14/28 fields examined in Sask.; the av. infection in the affected fields was about 2% (R. C. Russell). Infection by covered smut was 0-12%, av. 0.3% and that by false loose smut 0-10%, av. 0.7% in the 108 fields examined in Man. Although these smuts are comparatively easily controlled by seed treatment, some heavy infections continue to be observed (W. Popp). Infections of 10-20% were quite common in fields in Kamouraska Co., the disease appeared to be more prevalent than usual (R. O. Lachance). False loose smut (U. nigra) affected 10% of heads in a field of Fort barley in the Lake St. John area. The species was checked by germinating the spores (L. J. Coulombe). About 1% of the heads were affected in a field at Brackley, P. E. I. (R. R. Hurst).

**LOOSE SMUT** (Ustilago nuda). A tr. -1% of loose smut was found in 2 fields about Creston, B. C. (J. S. H.). Loose smut was present in 138/351 fields examined in Alta. Infection was tr-40%, av. 1.4% (W. P. C., J. S. H., A. W. H.). Loose smut affected 15/28 fields examined in Sask.; the av. infection was about 2%. The level of infection appeared to be somewhat heavier than last year especially in n. e. Sask. where the humidity was particularly high in 1953. Some false loose smut may have been present (R. C. Russell). Loose smut was prevalent in Man., particularly in some fields of Montcalm and to a lesser extent in Vantage and O. A. C. Infection was 0-12%, av. 1.6% in the 108 fields examined (W. Popp). Infections of 1-10% loose smut were seen in most fields in Kamouraska Co., Que.; it appeared to be more prevalent than usual (R. O. Lachance). Loose smut was noticed in several fields in Richelieu Co.; less than 1% of the heads were affected (R. Crete).

**BACTERIAL BLIGHT** (Xanthomonas translucens). Infection of the heads was 24-tr. 30-sl. 5-sev./351 fields in Alta. (W. P. C., J. S. H.). A sl. infection was found on the leaves in 3/11 fields examined in Man. (W. A. F. Hagborg).

**FALSE STRIPE** (virus) occurred in several fields and plots at the Station, Lethbridge, Alta., where infected seed was sown. None was recorded in farmers' fields (J. T. Slykhuis).



STREAK MOSAIC (virus). Infection was a tr. in one field and mod. in another in s. Alta. These fields were adjacent to sev. infected wheat fields. The disease did not spread far into the barley and was of minor importance (J. T. S.).

BARLEY YELLOW DWARF (virus). Last summer symptoms resembling barley yellow dwarf were found on barley, oats and wheat in the experimental plots at Lethbridge, Alta. Attempts to transmit the disease experimentally by using aphids were inconclusive (J. T. Slykhuis).

MISCELLANEOUS. Injury of barley heads by birds was observed in samples sent from Kamsack, Sask., by the Agricultural Representative (T. C. Vanterpool). A case of Chlorosis was observed s. of Prince Albert. It was attributed to lack of nitrogen brought about by the cold weather this spring. Seedlings showing delayed growth and purple colour in the leaf sheaths were observed at Asquith. The soil was poor and probably deficient in phosphorus (T. C. V.).

A sl. -sev. stunting of the plants was observed in four fields around Camrose and Lacombe, Alta. It is suspected that the plants were injured as a result of cold, wet weather (W. P. C., G. B. S.).

### RYE

ERGOT (Claviceps purpurea). Infection was 7-tr. 1-sl. /30 fields examined in Alta. No ergot was observed in rye in the Peace River District, except at two places on plants along the roadside (W. P. C., J. S. H.). (cf. Ergot Survey). Infections in Eastern Canada were: sl. in a field at St. Catharines, Ont. (T. R. Davidson), sl. in 2 fields at Shawville (E. H. Peters) very sl. at the Station, Fredericton, N. B. (J. L. Howatt), tr. at Berwick, N. S. (D. W. Creelman), and sl. on Prolific in the rust nursery, at Charlottetown, P. E. I. (J. E. Campbell).

POWDERY MILDEW (Erysiphe graminis) was recorded as follows: traces in 8 fields in s. Alta. (J. S. Horricks); sl. and general in the plots at Saskatoon, Sask., where it is seldom observed (T. C. Vanterpool); sl. in a field at Stamford, Ont. (T. R. Davidson).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Infection was 6-tr. 13-sl. 2-mod. /30 fields in Alta. Relatively little rye was grown in 1954 (W. P. C., J. S. H.).

TAKE-ALL (Ophiobolus graminis). A trace was found in one field and a slight infection in another in the Peace River District, Alta. (W. P. C.).

STEM RUST (Puccinia graminis). Tr. -sl. infections were recorded in 2 fields in e. -central Alta. (W. P. C.).

LEAF RUST (Puccinia secalis). Traces were found in 2 fields in s. Alta. (J.S.H.). Infection was mod. in a field examined at Stamford, Ont. (T.R. Davidson).

SPECKLED LEAF BLOTCH (Septoria secalis). Infection was 8-tr. 5-sl. 2-mod./30 fields examined; the affected fields were all located in central Alta. and the Peace River District (W. P. C. , J. S. H.).

STEM SMUT (Urocystis occulta). A tr. was found in a field of rye near Paisley, Ont. A previous record of this smut in Ont. is a herbarium specimen collected at Preston on 24 July 1912 by H. Groh (I. L. Conners).



## RUST NURSERIES IN CANADA IN 1954

B. Peturson, G. J. Green and A. M. Brown

In Report 8, issued by the Plant Pathology Laboratory, Winnipeg, Man., December 1954, are recorded the observations on the occurrence of rusts and several other diseases on varieties of wheat, oats, barley, rye and flax grown in 34 places in Canada in 1954. The incidence of the various diseases on the different varieties is presented in eight tables with a summary of the data in a ninth, which alone is here reproduced (Table 2).

Twelve varieties of wheat, eight of oats, five of barley, one of rye and three of flax were grown in the nurseries. The varieties were: wheat - McMurachy, Lee, Kenya Farmer, Little Club, Marquis, Minidum, Thatcher, Selkirk, Norka, Redman, Exchange, and Frontana; oats - Bond, Trispermia, Ajax, Vanguard, Garry, Clinton, Landhafer, and Rodney; barley - Montcalm, Black Hullless, Vantage, Peatland, and Feebar; rye - Prolific; and flax - Rocket, Bison, and Dakota.

A review of the incidence and development of cereal rusts in Western Canada is published in the original report, but a slightly expanded account is included below.

### Cereal Rusts in the Prairie Provinces in 1954

In 1954, much of the wheat-growing area of the United States and Canada experienced a most widespread and destructive cereal rust epidemic.

This epidemic had its beginnings in centres in Northern Mexico and southern Texas where the red spores of stem rust survived the winter of 1953-54. Stem rust was increasing on wheat in southern Texas in late February. At that time stem-rust spores were caught on slides exposed in central Texas and by mid-March stem-rust infection was also observed in the region. Rust development occurred earlier in these southern areas in 1954 than in 1953 when stem rust did not appear until early April. Leaf rust of wheat likewise developed earlier there than in 1953 with the result that this rust was general throughout the whole of Texas by the end of March.

However, rust development was severely checked in Texas by drought in April and no further spread of any consequence occurred until rains came late in that month. By the middle of May slight amounts of stem rust were present in southern Oklahoma, and a trace had appeared in Southern Kansas. By 1 June leaf and stem rust of wheat had become quite prevalent in northern Texas and the southern half of Kansas and had spread in small amounts northwards into Nebraska.

Stem and leaf rust spores in small numbers began to appear on slides exposed in southern Manitoba during late May. Towards the end of the first week in June conditions were very favourable for the north-

ward spread of rust spores and a heavy leaf and stem rust spore shower occurred over Man. and Sask. The concentration of stem and leaf rust spores appeared to be greater in eastern Sask. at that time than in Man. During the period over 200 spores of leaf and stem rust per square inch of slide were deposited on spore-trap slides exposed at Regina, Sask., while only a small fraction of that number was deposited on the slides exposed in central and eastern Man. There is no record of the spores occurring in the air over parts of Sask. north and west of Regina as no spore traps were located there. However, the tremendous number of spores which occurred on slides exposed at Regina in early June indicates that spores in substantial numbers were carried at that time far to the north and west of this point. That this occurred was shown by the fact that stem-rust and leaf-rust infections appeared almost simultaneously on wheat throughout the area from eastern Man. northwestward to North Battleford in Sask. about 10 days after the advent of this spore shower.

### Stem Rust of Wheat

This year, wheat stem rust (Puccinia graminis var. tritici) was first found at Morden, Man., on 17 June, a day later than in 1953. That same week stem and leaf rust of wheat were found throughout the area extending northwestwards from s. e. Man. to beyond North Battleford in n. w. Sask. The heavier infections occurred in the central and n. w. parts of Sask. On 26 June about 40 % of the wheat plants in some localities showed stem rust pustules. At that time a trace of leaf rust occurred on 80 % of wheat plants in some fields in central and n. w. Sask. During the next two weeks stem rust spread westward into Alta. but in smaller amounts.

Moisture conditions were extremely favourable for rust development throughout the whole of Western Canada during the entire growing season of 1954 and stem rust became heavy on Thatcher, Redman, Lee and other varieties susceptible to race 15B, the predominant race of wheat stem rust in the area. The heaviest rust infection extended in a wide strip northwestwards from Morden, Man. through Man. to beyond North Battleford, Sask. (See Fig. 1). Within this heavy rust area the average stem-rust infection on the above named varieties ranged from 30 % to 70 % with the most severe infections occurring in the area from Regina to North Battleford. In n. e. Sask. stem rust infection was less severe and in s. w. Sask. rust was light. In e. Man., rust infection was much less severe than in the heavy rust areas of central Sask. Before the end of the season stem rust spread westward across Alta. However, in that province severe infection was confined largely to the east central part of the province. Thatcher, Redman and Lee carried about equal amounts of stem rust but trace amounts only occurred on Selkirk.



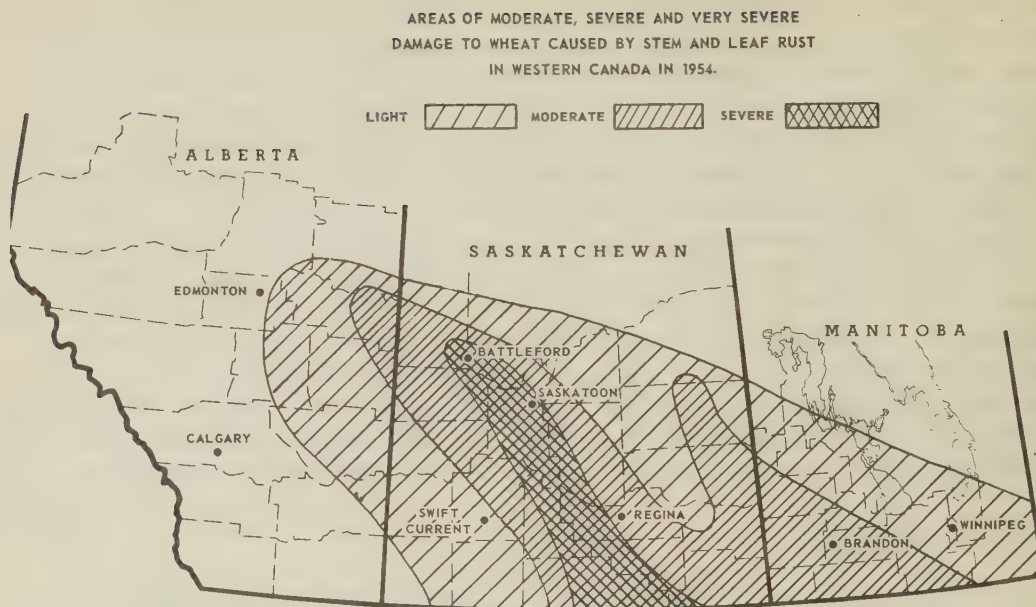


Fig. 1. Map showing relative severity of the damage caused by rust in Western Canada in 1954.

Durum wheat throughout the rust area of Western Canada carried an appreciably heavier infection than the bread wheats. Infections in much of the durum ranged as high as 80%.

#### Leaf Rust of Wheat

Leaf rust of wheat (*Puccinia triticina*) was first found in Western Canada, in 1954, at Winnipeg, Man., on 16 June. Next day it was found at Morden. On 21 June traces were found at Dauphin and on 22 June it appeared in trace amounts on Thatcher wheat at Saskatoon, Sask. On 26 June leaf rust was found at North Battleford and shortly thereafter had spread into Alta. Leaf rust was coextensive with stem rust and in most areas infections were much heavier than those of stem rust. It was heavy throughout Man., Sask., and e. Alta. Generally, average infections ranged from 60% to 80% on Thatcher and Redman with the heavier infections occurring on Thatcher. These varieties in most fields in Western Canada were completely defoliated by leaf rust two to three weeks before the plants ripened. Leaf rust also occurred on Selkirk wheat but in relatively light amounts. The leaf rust infection appeared on Selkirk considerably later than on Thatcher and Redman. When the first leaf rust infections were observed on Selkirk the intensity of infection on Thatcher and Redman had reached 30-50%. In the most severely leaf-rusted fields Selkirk carried infections averaging 25-40%. Some leaf rust occurred on Lee wheat but in negligible amounts. Durum

wheats were only slightly affected by leaf rust.

### Stem Rust of Oats

In 1954, stem rust of oats (Puccinia graminis var. avenae) was first observed on oats, in trace amounts, on 6 July in south-central Man. and on 11 July in e. Sask. Like stem rust of wheat, oat stem rust extended considerably farther west than usual. It was fairly prevalent throughout much of Man. and Sask. and extended westward into Alta. to some distance n.w. of Edmonton. However, in that province severe infections were confined to the extreme eastern part of the mid-central area. It was quite severe throughout the rust area of Sask. and Man., particularly on varieties such as Victory and Banner that are susceptible to race 7, the most prevalent race in Western Canada in 1954. Infections were much lighter on the varieties Vanguard, Fortune, Ajax, and Exeter all of which are resistant to race 7. However, certain other races (8, 10, and 11) to which these varieties are susceptible were also present and in late fields these varieties became heavily infected. No stem rust was found anywhere on Garry oats but trace amounts were present in some fields of Rodney.

### Crown Rust of Oats

Crown rust (Puccinia coronata var. avenae) appeared considerably later than the rusts on wheat. The first traces of crown rust were observed in Man. on 6 July. From that date it spread rapidly northwards and westwards across the prairies to a point just beyond Edmonton, Alta. There are no previous records of crown rust reaching so far north and west. In fact, crown rust has seldom been found west of central Sask. This rust became very heavy in late stands of oats throughout Man. and eastern Sask. In Alta. crown rust occurred mostly in trace amounts. However, a few fairly heavy infections were observed in the eastern part of central Alta. Vanguard, Ajax, Victory, Banner, Fortune and several other varieties, which are susceptible to all races of crown rust, were severely attacked by this rust in many areas in Man. and Sask. Crown rust infections on these varieties in later stands ranged from 60 to 80%. Garry and Rodney, which are resistant to about half of the races that occur in Western Canada, were less affected than the other varieties mentioned. These two varieties carried infections averaging 20-40% in areas where the crown rust infection averaged upwards of 70% on the susceptible varieties. Throughout the rust area these varieties substantially outyielded the susceptible ones.

### Other Cereal Rusts

Sl. to mod. amounts of leaf rust (Puccinia hordei) occurred on barley in Man. and eastern Sask. It was not observed anywhere in damaging amounts.



Traces of stem rust (Puccinia graminis var. secalis) and leaf rust (Puccinia secalina) were found in a few fields of rye in southern Man. (B. Peturson and G. J. Green).

### Influence of Weather on Cereal Rusts in 1954

Weather conditions throughout much of Western Canada were quite favourable for the development of rusts during most of the 1954 growing season.

Temperatures were below normal in April and May, (10°-15° F. in April and 4°-8° F. in May). As a consequence seeding was delayed in many districts and in areas where seeding was possible germination was greatly retarded. Excessive rains throughout the prairies during the last ten days in May also delayed seeding operations. As a result of this unseasonable weather seeding operations in all three prairie provinces were delayed by from two to three weeks. This delayed seeding was one of the major causes contributing to the 1954 rust epidemic. Precipitation was much above normal throughout Sask. during nearly all of the growing season. Precipitation exceeded the normal rainfall by 100, 50, and 100% respectively in June, July and August. This high rainfall greatly favoured germination of rust spores. In fact, there was during this period hardly a day when conditions were unfavourable for spore germination. In both Man. and Alta. precipitation also appreciably exceeded the normal for the whole season although there were some periods during parts of July when precipitation was below normal in certain areas of these provinces. Precipitation was also below normal in Man. in August.

June temperatures were from 2° below to 1° F. above normal over most of grain-growing areas of the prairie provinces, except for an area in s.w. Sask. and s.e. Alta. where temperatures were 4° F. below normal. For July temperatures were above 1° F. above normal over Man. and Sask. except the southwest corner. There and in Alta. the temperature was 2° below normal. August temperatures were about 1° F. above normal for Man. and 2° below normal for Sask. and Alta.

Although temperatures were generally slightly below normal in Western Canada during the period of rust development they were high enough for rapid rust development. The correctness of this view was demonstrated in rust culture experiments carried out at the Plant Pathology Laboratory, Winnipeg. These experiments showed that the incubation period of stem rust of wheat under outside conditions varied from 7 to 9 days during June, July and August. Moisture conditions on the prairies were ideal for spore germination, particularly in Sask. during the whole growing period. As a result of these favourable conditions for rust initiation and development in the prairie provinces very severe rust epidemics, particularly of leaf rust of and stem rust of wheat, occurred throughout Man. and Sask. and in parts of Alta. (B. Peturson).

### Damage Caused by Cereal Rusts in 1954

This year, cereal rusts, particularly stem and leaf rust of wheat, caused greater reductions in yield and quality of cereal crops in Western Canada than in any previous year. As stated earlier, much the heaviest stem-rust infection occurred on durum wheat; a lighter, but severe, stem rust infection of unprecedented severity occurred on the predominant wheat varieties, Thatcher and Redman, and a much less severe rust infection occurred on oats. The damage caused to the various cereal crops was in direct proportion to the amount of rust present.

A wheat crop that at the beginning of August 1954 gave promise of an average yield of at least 21 bushels per acre for all of Man. and Sask. was so severely reduced by rust, excessive moisture, hail, and frost that the actual yield amounted to only about 10 and 14 bushels per acre respectively for Sask. and Man. This reduction of some 180 million bushels in expected yield was due more to the ravages of rust than to adverse weather.

As a comparison of the yield performance of a resistant and a susceptible variety under rust epidemic conditions gives a measure of rust effect an attempt to compare the yields of Selkirk (a highly resistant variety) with the yields of the prevalent susceptible varieties was made to measure the effect of rust on yield in 1954. Through the kindness of the United Grain Growers Company, which made available the results of a questionnaire sent to their elevator agents on the yields of Selkirk and Thatcher wheat, and through other data on comparative yields of Selkirk, Thatcher, Redman, and Lee obtained through a questionnaire sent to contract seed growers, yield data were obtained from about 300 points in Man. and Sask. In nearly every instance comparison was made between pairs of fields of Selkirk and a susceptible variety sown on summerfallow and seeded about the same date. In Man. the average yields per acre were as follows: Selkirk 35 bu., Lee 21 bu., Redman 17 bu., and Thatcher 14 bu.; while those for Sask. were: Selkirk 31 bu., and Thatcher 13 bu. The poor performance of the susceptible varieties may be attributed mainly to the effect of rust, and the superiority of Lee over Thatcher and Redman was, no doubt, due to its very high leaf rust resistance. Although final estimates of rust losses to wheat in the Prairie Provinces have not yet been reached it is considered probable that these losses were not less than 135 million bushels.

Durum varieties were more severely affected by rust than bread wheats. In Man. and Sask. they yielded about 7 bu. per acre, i. e. about one half that of Thatcher. Late oat fields were severely rusted and the yield materially reduced. However, the main oat crop was much less severely rusted than the wheat and oat yields in both Man. and Sask. equalled or slightly exceeded the long time average. (B. Peturson).



Table 2. Incidence of certain pathogenic fungi on wheat, oats barley and rye grown at 34 locations in Canada in 1954.

Locality	WHEAT			OATS		BARLEY							RYE	
	<u>P. graminis tritici</u>	<u>P. tritici</u>	<u>Erysiphe graminis</u>	<u>P. graminis avenae</u>	<u>P. coronata avenae</u>	<u>P. graminis</u>	<u>P. hordei</u>	<u>Erysiphe graminis</u>	<u>Septoria passerinii</u>	<u>Rhynchosporium secalis</u>	<u>Helminthosporium sativum</u>	<u>Helminthosporium teres</u>	<u>P. graminis secalis</u>	<u>P. secalina</u>
Saanichton, B. C.	0	1	3	0	0	0	0	4	3	0	0	0	0	0
Agassiz, B. C.	-	2	2	-	0	-	0	4	-	-	-	-	-	2
Creston, B. C.	4	4	1	1	0	2	0	0	0	0	4	0	2	2
Beaverlodge, Alta.	1	2	0	0	0	0	0	0	0	4	0	0	0	0
Edmonton, Alta.	1	4	0	1	1	1	0	0	1	4	0	0	0	1
Lacombe, Alta.	1	1	0	0	0	0	0	0	0	4	0	0	0	2
Lethbridge, Alta.	3	3	0	1	0	3	0	0	0	1	0	0	1	0
Scott, Sask.	2	4	0	1	1	2	0	0	0	4	0	0	1	1
Melfort, Sask.	2	3	0	3	1	1	2	0	0	3	0	0	1	1
Indian Head, Sask.	4	4	0	4	4	3	0	0	4	0	0	0	1	2
Brandon, Man.	4	4	0	4	4	3	2	0	0	0	0	2	2	4
Morden, Man.	4	4	0	4	3	4	1	0	2	0	0	2	1	3
Winnipeg, Man.	4	4	0	4	4	2	1	0	1	0	0	4	2	2
Fort William, Ont.	4	3	0	4	1	2	2	0	0	1	0	1	2	2
Kapuskasing, Ont.	4	4	0	2	1	1	0	0	3	0	0	0	0	0
Mindemoya, Ont.	4	4	0	4	4	2	3	0	0	0	1	0	2	4
Guelph, Ont.	4	3	3	2	2	2	2	4	-	-	-	-	3	3
St. Catharines, Ont.	4	4	1	3	2	3	2	1	-	-	-	-	1	2
Appleton, Ont.	1	0	0	4	4	2	0	0	0	0	1	0	2	-
Ottawa, Ont.	4	3	0	2	4	1	2	3	-	-	-	-	4	2
Merrickville, Ont.	1	3	1	3	-	0	2	0	-	-	-	-	2	1
Kemptville, Ont.	1	1	4	2	-	1	1	4	0	0	4	0	2	0
Williamstown, Ont.	2	2	0	4	3	-	1	0	-	-	-	-	2	1
Macdonald College, Que.	2	4	1	2	4	1	4	1	2	0	3	0	1	3
L'Assomption, Que.	3	3	0	2	2	2	3	1	2	0	2	0	2	-
Lennoxville, Que.	4	4	0	3	4	-	-	0	-	-	-	-	3	3
Normandin, Que.	2	2	0	1	1	1	1	0	0	0	3	0	0	0
Ste. Anne de la Poc., Que.	2	3	1	1	2	0	2	1	0	2	0	0	1	1
Fredericton, N. B.	3	4	0	2	4	2	4	-	0	0	2	0	3	3
Kentville, N. S.	1	3	0	4	2	0	2	0	-	-	-	-	1	2
Nappan, N. S.	0	2	3	1	1	1	2	0	0	0	1	0	0	3
Pictou, N. S.	0	-	-	2	4	-	-	-	-	-	-	-	0	0
Charlottetown, P. E. I.	0	1	0	1	1	0	1	0	0	0	4	0	0	2
St. John's West, Nfld.	0	0	-	0	0	0	0	-	-	-	-	-	0	0

Note: - = no observations made; 1 = trace, 2 = light, 3 = moderate; 4 = heavy.

### Cereal Rusts in the Rust Nurseries

The incidence of wheat stem rust in the rust nurseries is summarized in Table 2. The level of infection on the varieties Lee, Mindum, Thatcher, and Redman is an indication of the geographical distribution and prevalence of race 15B. This race was present in most eastern nurseries and predominated in all western nurseries except in B.C. At many locations in Eastern Canada heavy infections occurred on the 15B-resistant McMurachy for the first time since it was included in the rust nurseries. Light infections were also found on this variety at Morden and Brandon in Man. The races isolated from McMurachy were 29 and 48 in Man., Ont. and Que. and 139 in N.B. The isolates of race 48 differ from those of this race obtained in previous years in their ability to attack McMurachy. The isolation of race 139 from McMurachy was not unexpected as 1953 isolates of this race could attack it. The race identified as 29 is a biotype, rather virulent to Selkirk and McMurachy, which was isolated once in 1953 from a collection made at Winnipeg. In the rust nurseries, generally, Selkirk (McMurachy  $\times$  Exchange)  $\times$  Redman<sup>3</sup>) was more resistant than McMurachy, the heaviest infection recorded on the former being 5% at Morden. The variety Kenya Farmer was highly resistant in all nurseries.

Wheat leaf rust (Table 2) was present in all nurseries. Heavy infections occurred generally in Man. and Sask. and in several nurseries in Eastern Canada. The new variety Selkirk was much less severely affected than varieties such as Redman and Thatcher but moderate infections occurred at several locations. Kenya Farmer, which is resistant to leaf rust except certain isolates of races 5, 15, 58 and 126, was heavily infected only at Macdonald College. Lee, Exchange and Frontana were highly resistant in all nurseries.

Moderate to heavy infections of oat stem rust (Table 2) were present from Sask. to western Que. Very light infections occurred east and west of this region. Race 7 was probably responsible for most of the heavy infection on Clinton, and no doubt predominated in the nurseries as it did in 1953. The somewhat lighter infections on Ajax and Vanguard were probably caused by races 8, 10 and 11, with race 8 being the most common. The variety Rodney was highly resistant in all nurseries except at Brandon where it was attacked by race 7A, the only race known to be capable of attacking it. Garry was highly resistant in all nurseries.

Crown rust (Table 2) was very prevalent in many of the nurseries in Eastern Canada. In Western Canada it was very abundant in all the nurseries in Man. and eastern Sask. It occurred in trace amounts in the Scott nursery in western Sask. and in the Edmonton nursery in Alta. No crown rust was found in the nurseries in B.C. and Nfld. This year crown rust spread farther north and west than in any year since rust nurseries were established in 1926. In almost all nurseries where crown rust occurred, Garry and Rodney carried about equal amounts of rust, about half as much as Bond, Clinton, Ajax and Vanguard. No rust, or trace amounts only, occurred on Trispermia and Landhafer except at



Pictou, where infections of 15% and 35% respectively were present. This rust was in the telial stage and the physiologic race responsible for the infection could not be identified.

The distribution of stem rust on barley (Table 2) was similar to that on wheat. However, the relatively heavy infection on the wheat stem rust resistant variety Vantage and the very light infection on the rye stem rust resistant variety Black Hullless at Fredericton, indicated that much of the rust there was rye stem rust. Nevertheless the available evidence indicates that the infection (20%) on Vantage at Lethbridge was wheat stem rust. Leaf rust of barley was prevalent in Eastern Canada but only light infections occurred in the west.

Leaf rust and stem rust of rye (Table 2) were prevalent in most nurseries.

### Other Diseases

The incidence of certain other diseases in the nurseries is also given in Table 2. Powdery mildew of wheat and barley occurred only in B. C. at some locations in Eastern Canada. Powdery mildew of oats and rye was not observed in any nursery. Speckled leaf blotch of barley (Septoria passerinii) was present at several widely separated locations, moderate or heavy infections occurring at Saanichton, B. C., Indian Head, Sask., and Kapuskasing, Ont. Heavy infections of scald (Rhynchosporium secalis) were noted at Beaverlodge, Edmonton, and Lacombe, Alta., and at Scott and Melfort, Sask. Most nurseries in Eastern Canada showed spot blotch (Helminthosporium sativum) but in the west the disease was present only at Creston, B. C. New blotch (H. teres) was found in all Man. nurseries and at Fort William, Ont.

Flax rust occurred in small amounts in seven of the western nurseries: Beaverlodge, Lethbridge, Scott, Indian Head, Brandon, Morden and Winnipeg. It also occurred in trace amounts in the nursery at Ottawa. No rust was found on Rocket in any of these nurseries. Rust occurred on Bison at all of the eight nurseries listed above and on Dakota at all except the nurseries at Ottawa and Beaverlodge. At Winnipeg the rust on Bison and Dakota averaged 20% and at the other nurseries where these varieties became infected the infection ranged from trace to 5%. At the other 24 nurseries no rust was found on the varieties. Bison, Dakota and Rocket.

## PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1954

T. Johnson, B. Peturson, G. C. Green and A. M. Brown

In Report 9 issued by the Plant Pathology Laboratory, Winnipeg, Man., January 1955, an account is given of cereal rust development in Western Canada in 1954 and the distribution in Canada is recorded of the physiologic races of the rusts: wheat stem rust (*Puccinia graminis* var. *tritici*), wheat leaf rust (*P. triticea*), oat stem rust (*P. graminis* var. *avenae*) and oat crown rust (*P. coronata*). Isolations from collections of aecia from barberry and buckthorn are also recorded.

Cereal rust development in Western Canada has already been covered in Report 8, on the Rust Nurseries. The other two sections have been summarized below.

### Distribution of Physiologic Races

#### Puccinia graminis var. tritici

The 1954 stem-rust survey included 361 isolates. The following races were isolated (the number of isolates of each race given in brackets): race 10 (1); race 11 (1); race 15 (2); race 15B (283) further distinguished as the biotypes 15B (274), 15B-3 (6), and 15B-4 (3); race 29 (30) in the biotypes 29-1 (21), 29-2 (7), and 29-3 (2); race 37 (1); race 38 (5); race 48A (14); race 56 (15); race 59A (1); race 59C (5); race 87 (2) and race 139 (1).

Race 15B was the predominant race in both Eastern Canada and the Prairie Provinces, accounting for 77% of all Canadian isolates. Most of the isolates of this race were of the type widely prevalent since 1950, designated simply as race 15B. Two other biotypes of this race, distinguishable by means of the accessory varieties Golden Ball, Selkirk, and McMurachy, were found in small amounts. Six isolates of the biotype designated 15B-3 were collected in the Prairie Provinces. This biotype is more virulent than the others to Selkirk and McMurachy. Three isolates of 15B-4 (formerly called 15B-2) were collected in Man. This biotype is distinguishable from the others by its greater virulence on Golden Ball. It is now referred to as 15B-4 because the designations 15B-1 and 15B-2 are in use in the United States for biotypes identified at the University of Minnesota. Other strains of the race 15 complex found in 1954 include race 15 found in N. B., near barberry, and race 87 found in Ont. and Man. Race 87 differs from race 15B-3 chiefly by the production of X type of infection instead of 4 type on Mindum, Spelmar and Kubanka.

After race 15B, race 29, accounting for 8% of all isolates, was the next most prevalent. In this race, three biotypes were distinguished by means of accessory varieties: race 29-1 virulent on Golden Ball, Selkirk and McMurachy; race 29-2 non-virulent on Golden Ball but virulent on Selkirk and McMurachy; and race 29-3 virulent on



Golden Ball but not on Selkirk and McMurachy. The two biotypes virulent to Selkirk, which constitute more than 7% of all isolates, are the most common of the rust strains known to be pathogenic to that variety.

Race 56, the predominant race for many years prior to 1950, was reduced to the low ebb of 4% of the isolates.

The rather wide distribution of race 48 in Eastern Canada is of interest. This race had a wide distribution in the southern United States in 1954 but occurred only to a slight extent in the Prairie Provinces where it had little opportunity to get established because the wheat varieties now grown there are resistant to it. In Eastern Canada it gained a wide distribution and was responsible for severe rusting of McMurachy wheat in several rust nurseries. In these nurseries, Selkirk was virtually free from stem rust. This is the first time that McMurachy has shown any appreciable amount of stem rust in the Uniform Rust Nurseries in Canada. The race 48 encountered this year is pathogenically distinct from isolates found in former years and should therefore be regarded as a strain of race 48. It is here designated as race 48A.

#### Stem Rust on Barley

In 1954, stem rust on barley belonged predominantly to var. tritici. Of 53 isolates from barley 47 belonged to var. tritici and only 6 to var. secalis.

#### Puccinia triticina

The physiologic races of wheat leaf rust were recorded according to the "Unified Numeration" (UN) key adopted in 1948, by American and Canadian investigators of this rust. In this key the races are grouped into 24 classes into which they fall if the differential hosts comprise the varieties Malakof, Webster, Loros, Mediterranean and Democrat. In 1954, race identification was performed by using these hosts with the addition of the varieties Brevit and Renown. By using the latter variety it was possible to isolate "biotypes" of certain races that would otherwise have escaped notice. The varieties Carina and Hussar were used occasionally to test the reaction of the complete set of differential hosts to isolates of certain races. The original race numbers that correspond to the UN groups are also given.

All rust collections were initially increased on the susceptible variety Little Club. Two single-pustule isolates were subsequently established from each collection. These were, after increase, cultured on the differential hosts and the resultant race identifications established. The remainder of the original cultures were used to inoculate "screening" sets composed of the varieties Exchange, Lee, Kenya Farmer and Selkirk. The reaction of the variety Lee indicated the presence of rust strains somewhat pathogenic to it in the seedling stage. In 1953, Lee was resistant to all of the races isolated in Western Canada, but this year this

variety was susceptible to certain isolates of race 126 and its biotype 126a. The reaction of Kenya Farmer paralleled that of Lee.

Altogether 342 isolates were studied and identified as follows (number of isolates in brackets): UN 1 = races 1 (6) and 1a (5); UN 2 = races 15 (17) and 15a (88); races 3 (1) and 58 (65); UN 5 = races 5 (9) and 5a (87); UN 6 = races 126 (28) and 126a (20); UN 9 = race 9 (5); UN 10 = race 11 (7); UN 11 = race 93 (2); UN 13 = race 35 (2). Races with the suffix "a" are virulent to seedlings of Renown and several derivatives of H44 and Hope.

The race distribution in 1954 was rather similar to that of 1953. Race 58 was predominant in Eastern Canada, especially in Ont. and races 5a and 15a comprised most of the rust in the Prairie Provinces. Race 1 was found only in B. C. and Que. and race 1a in B. C. while race 11 was found in Ont. Sask. and Alta. Races 126 and 126a were more common in the Prairie Provinces than in the preceding year. Race 126 is probably a complex, including race 105 which has never been readily distinguishable from it under Winnipeg greenhouse conditions. This complex is of particular interest because some elements of it show evidence of pathogenicity to the rust-resistant variety Lee. Selkirk and Exchange are only moderately resistant to this race.

In greenhouse tests, it was noted that Rosen rye, in the seedling stage, proved to be a congenial host to races 5, 5a, 11, 15, 15a, 126 and 126a. To these races, however, Prolific rye was resistant. As Rosen is a winter rye its ability to harbor leaf rust of wheat raises the question of whether or not varieties of winter rye could play any part in the overwintering of this rust in areas north of the winter wheat belt.

#### Puccinia graminis var. avenae

In the 1954 oat stem rust survey, 175 isolates were studied. The races isolated (number of isolates of each race in brackets) in order of prevalence were: race 7 (80), race 8 (4), race 10 (19), race 2 (11), race 5 (6), race 11 (5), race 7A (4), race 6 (4), race 13 (4), race 4 (1), and race 12 (1).

The varieties Rodney and Garry were included with the differential hosts Victory, White Russian, Richland, and Sevnothreee. Rodney is susceptible only to race 7A and differentiates this race from race 7. Garry is resistant to all races isolated to date in Canada.

Race 7, comprising 45% of the isolates, predominated in 1954 as it has for several years. Race 8 was second in order of prevalence in 1954 as in 1953 but it constituted 23% of the isolates in 1954 as against 14.6% in 1953. This increase in the prevalence of race 8 is important in Western Canada where the predominant varieties such as Ajax, Exeter, Fortune and Vanguard are resistant to race 7 but susceptible to race 8. Four isolates of race 7A were obtained in 1954 as against 2 in 1953. The increased prevalence of this race is significant because it can attack the new variety Rodney. Races 6 and 13, which can attack the varieties White Russian (resistant to race 8) and Richland (resistant

to race 8) and Richland (resistant to race 7) and their derivatives, constituted approximately 5% of the isolates, as they did also in 1953. Races 2, 7, 7A, 8, 10, and 11 were distributed across the country; races 6 and 13 were found only in Ont; races 5 and 12 occurred only in Western Canada and race 4 only in N.B. Race 7A occurred in Eastern and Western Canada as it did in 1953. Races 6 and 13 have occurred in Eastern Canada for several years but have not been found in Western Canada in recent years.

#### Puccinia coronata var. avenae

Uredinial collections of crown rust of oats were obtained, in 1954, from all the Canadian provinces except B.C. and Nfld.

The crown rust races present in these collections were identified on the basis of the rust reactions produced on the ten new differential host varieties, Anthony, Appler, Bond, Bondvic, Saia, Ukraine, Trispermia, Victoria, Santa Fe, and Landhafer. The rust reaction of the two new oat varieties, Garry and Rodney were ascertained also to each of the rust collections.

In all 177 isolates were studied. The number of isolates identified is indicated in brackets after the number of the race. 201 (24), 202 (45), 203 (18), 205 (1), 209 (3), 210 (1), 211 (8), 212 (10), 216 (1), 226 (2), 228 (7), 229 (1), 231 (4), 234 (7), 235 (6), 237 (7), 238 (2) 239 (12) and 240 (12). Two of these races 205 and 216, had not been found previously in Canada but both have been found repeatedly in the United States.

Races 201, 202 and 203 were the most prevalent races in Western Canada, while in Eastern Canada, races 201, 202 and 239 were most prevalent. In Western Canada, races 201, 202, 203, 205, 209, 210, 211 and 216, all of which heavily attack varieties which possess the Bond type of resistance, comprised 80.5% of all isolates, whereas in Eastern Canada, these races comprised 49.5% of all isolates. The varieties Garry and Rodney proved resistant to about 70% of the isolates. The variety Victoria was susceptible to one isolate (race 216) while Trispermia, Santa Fe and Landhafer were resistant to all the isolates.

#### Isolations from Aecia

During June and early July of 1954 collections of aecia on barberry (*Berberis vulgaris*) and buckthorn (*Rhamnus* spp.) were forwarded to the Winnipeg Laboratory by cooperators in Eastern Canada. For this assistance we wish to thank the following: K. A. Harrison, Kentville, N. S.; J. L. Howatt, Fredericton, N. B.; H. R. Klinck, Macdonald College, Que.; J. W. MacRae, Kemptville, Ont.; W. H. Waddell, Guelph, Ont.; T. C. Vanterpool, Saskatoon, Sask.; D. B. O. Savile, and I. L. Connors, Ottawa, Ont.; and D. W. Creelman, Kentville, N. S.

#### Aecia on Barberry

As in recent years, Little Club wheat, Victory oats, Rosen rye,



Agrostis alba, and Poa compressa were inoculated with aeciospores. Five varieties of stem rust were isolated. Var. secalis, which was present in 12 of the 13 collections, was the most common variety. Var. agrostidis was present in six collections, var. tritici in three, var. avenae in three and var. poae in two. Races 15B-1, 31, 34, and 204 were identified from 2 collections of var. tritici (from Kemptville, Ont.) and races 8 and 13 from the 3 collections of var. avenae. This order of prevalence agrees with that of 1953, except that var. poae was not isolated in that year.

In 1954, Phleum pratense, Lolium perenne, Phalaris arundinacea, and Elymus canadensis were also inoculated with aeciospores. P. pratense and L. perenne were not infected, whereas, rust developed frequently on P. arundinacea and E. canadensis. Inoculation tests showed that in one instance P. arundinacea was infected with var. avenae and in two instances with var. agrostidis; only var. secalis was isolated from Elymus canadensis.

#### Aecia on Rhamnus spp.

In 1954, 38 aecial collections obtained on Rhamnus spp. in Eastern and Western Canada were studied. Most of the aecial collections were made on Rhamnus cathartica. However, collections were made also on R. japonica, R. saxatilis, R. utilis, and R. tinctoria. The aeciospores were transferred to certain cereals and grasses which distinguish between some of the varieties of crown rust. These were: Oats, rye, Festuca elatior, and Holcus lanatus.

From these collections three varieties of crown rust, Puccinia coronata var. avenae, P. coronata var. secalis and P. coronata var. festucae were obtained. Var. avenae was present in 37 of the collections; var. secalis in 9; and var. festucae in 4.

Fourteen physiologic races were identified from isolates obtained from the 37 collections of the var. avenae. The races identified were as follows with the numbers of isolates of each race given in brackets: 202 (3), 203 (2), 210 (1), 211 (1), 212 (3), 228 (2), 230 (2), 231 (8), 232 (4), 235 (5), 236 (1), 237 (1), 226 (4), and 240 (7).

# ERGOT IN CEREALS IN WESTERN CANADA IN 1954

W. P. Campbell

For a second year an extensive survey has been carried out for ergot in cereal crops in Western Canada. The results of the 1953 survey have already appeared (P.D.S. 33:23-28). The data for 1954 was also provided by the four plant pathology laboratories of the Botany and Plant Pathology Division in the Prairie Provinces. The results are presented in Tables 3-5.

Table 3. Fields of Wheat inspected for Ergot  
by Province and Crop District, 1954

C. D.	Manitoba		Saskatchewan		Alberta	
	Total	Ergot	Total	Ergot	Total	Ergot
1	9	1	33		42	
2	10		6		67	
3	48	2	10		18	
4	22	12			36	4
5	3	1	18		29	
6			35	1	78	5
7	14	1	17	1	97	3
8	12		10	1	24	4
9	16		16		1	
10	5				76	
11	1				19	1
12	3					
13					21	
14					23	2
15					17	
16					69	
Total	143	17	145	3	617	19
% Ergot		11.9		2.1		3.1

Table 4. Fields of barley inspected for ergot by province and crop district, 1954.

C. D.	Manitoba		Saskatchewan		Alberta	
	Total	Ergot	Total	Ergot	Total	Ergot
1	6		2		4	
2	4		2		11	
3	25	6	2		3	
4	6	2			2	
5	2	2	3		8	1
6	2	2	5	1	28	3
7	6		1		27	3
8	3				35	3
9	11	8	3	1	7	
10	11	1			42	3
11	9	2			50	3
12	2					
13	1				19	1
14					22	
15					11	
16					71	1
Total	88	23	18	2	340	18
% Ergot		26.1		11.1		5.3

Table 5. Fields of rye inspected for ergot by province and crop district, 1954.

C. D.	Manitoba		Saskatchewan		Alberta	
	Total	Ergot	Total	Ergot	Total	Ergot
1	8	8				
2						
3	4	4			21	1
4	1	1				
5	5	5				
6					1	1
7	11	11			4	2
8	2	2				
9			2	1		
10	1	1				
11	4	4				
12						
13	1	1				
14					2	2
15						
16					11	1
Total	37	37	2	1	39	7
% Ergot		100		50		17.9



From an examination of these tables it is evident that there was more ergot in cereals in Manitoba than in the other two provinces and that in contrast to 1953 the least ergot developed in cereals in Alta. On maps, not here reproduced, the more severely infected fields were plotted separately from those in which infection was a trace. It was especially noticeable in the map for rye that there was much more ergot in Man. than in Alta. The number of observations in barley and rye in Sask. were too few on which to base any conclusions. The most noteworthy observation in Alta. was the fact that although there was a marked decrease in the level of ergot in cereals in 1954, the amount of ergot on roadside grasses remained at a high level.

## II. DISEASES OF FORAGE AND OTHER FIELD CROPS

### A. FORAGE LEGUMES

#### ALFALFA

BLACK STEM (Ascochyta imperfecta) was generally distributed in Alta. ; infection was 25-tr. 36-sl. 9-mod. 1-sev./146 fields examined. In two fields leaf spot symptoms were sl. (J.B. Lebeau, E.J. Hawn). Infection was generally lighter and developed more slowly than in 1953 in Sask. ; it was estimated to be 17-sl. 30-mod. 1-sev./48 fields examined. Defoliation was also less than usual (H.W. Mead). Sl.-sev. infections were general in Man. Sev. diseased pedicels and pods were observed in many fields, in this way the disease appeared to be limiting seed production (W.C. McDonald). In the 46 fields examined in Essex and Kent counties, Ont., the disease was sev. only in three-year-old stands although it was of wide occurrence (W.G. Benedict). Black stem was present in most fields examined in Kamouraska Co., Que.; infection was only tr.-sl.(R.O. Lachance).

WINTER CROWN ROT (low-temperature basidiomycete) was found scattered through n. and central Alta.; infection 3-tr. 36-sl. 12-mod. 6-sev. (J.B. Lebeau). Infection was 18-sl. 2-mod./48 fields examined in Sask. Both crown rot and winter injury caused death of plants, the diseased plants being intermingled with others killed by winter injury (H.W. Mead).

BACTERIAL WILT (Corynebacterium insidiosum). Damage was 33-sl. 4-mod. 2-sev./146 fields examined in Alta. The disease developed slowly in s. Alta. on account of the partial resistance of Ladak. No infected fields were observed in the Peace River District (J.B.L., M.W.C.). Very little of the disease was seen in s.w. Ont.; in one field in Kent Co. 15% of the plants were affected (W.G. Benedict). A sl. infection was seen on Grimm at the Experimental Station and on the farm of the School of Agriculture, Ste Anne de la Pocatiere, Que. (R.O. Lachance).

ROOT ROT (Fusarium sp.) affected about 20% of the plants in 2 fields in Kent Co., Ont.; elsewhere the disease was negligible (W.G. Benedict).

LEAF SPOT and ROOT ROT (Leptosphaeria pratensis (Stagonospora meliloti)). Leaf spot infection was 4-tr. 3-sl./146 fields examined in Alta.; not observed in s. Alta. (J.B. Lebeau). Sl. infections of leaf spot were observed in scattered fields in Man. In one seed field in s.e. Man. the stems were blighted. The lesions on stems and pedicels were black bordered with white centres on which numerous pycnidia were visible. The pycnidia contained typical Stagonospora spores and the fungus was

isolated in pure culture. This phase of the disease has not been previously observed in Man. In addition the fungus has been found causing a crown and root rot during root rot surveys in recent years. The fungus was frequently isolated from discoloured vascular tissue. In plants collected at random in 3 areas in Man., the percentage of infected plants was greatest in the inter-lake region, much lower in s.e. Man. and least in the Red River Valley. The percentage of infected plants in 1951 was 3, 2, and 0% and in 1952, 7, 1, and 0% respectively. The explanation for the differences appears to be due to the prevalence of inoculum from infected leaves. In the Red River Valley, alfalfa is grown for hay and leaf spot does not develop extensively, whereas the other two regions are seed-growing areas and leaf spot continues to develop throughout the season. As the organism is comparatively slow growing and is readily overgrown by other soil fungi when tissue plants are made on agar plates, a greater percentage of the plants may have been infected than was recorded. Pathogenicity studies on 3-month-old plants showed that the Man. isolates were capable of causing a crown rot and a reddish flecking of the vascular tissue as reported in Wisconsin and California (Erwin, D. C. *Phytopathology* 44:137-144. 1954). This disease has not been reported previously in Canada. In 1954, typical symptoms of crown rot was observed on scattered plants in 2 fields near Liban (W. C. McDonald). A trace of leaf spot was observed in 3 fields in Essex Co., Ont. in Sept.-Oct. and a trace of crown rot was recorded in one field in Kent Co. in May (W. G. Benedict).

**DOWNY MILDEW** (*Peronospora aestivalis*) was of sporadic occurrence in Alta.; infection was 3-tr. 4-sl. 1-mod. 1-sev./146 fields examined (J. B. L., M. W. C.). A sev. attack was observed in the plots at Swift Current, Sask. In affected plants, the internodes were shortened, leaflets twisted and rolled, stems swollen. Oospores, conidiophores and conidia were found. Different clonal lines differed in their susceptibility (H. W. M.). Downy mildew was general in Man. on account of the cool wet weather. Infection was 2-tr. 4-sl. 5-mod./31 fields examined. In a 1954 seeding at Morden 75% of the plants were infected (W. C. McDonald).

**YELLOW LEAF BLOTCH** (*Pseudopeziza jonesii*). Infection was 1-tr. 7-sl. 9-mod. 19-sev./146 fields in Alta.; infection this year was one of the severest on record (J. B. L., M. W. C.). The disease was observed in 20 out of 48 fields examined in Sask.; infection was sl. and less defoliation resulted than usual (H. W. M.). Infection was 9-tr. 3-sl. 1-mod./31 fields examined in Man.; the disease was particularly noticeable in an area n.e. of Winnipeg (W. C. McDonald). Yellow leaf blotch was general and was observed in 26/34 fields examined in Essex and Kent counties, Ont.; it was found regularly in stands ready for mowing. It caused considerable loss of foliage in some fields (W. G. Benedict). The disease was present in all 15 fields examined in Drummond Co., Que.; but infection was sl. (R. O. Lachance).



COMMON LEAF SPOT (Pseudopeziza medicaginis) was general in Alta.; infection was 22-tr. 40-sl. 16-mod. 5-sev./146 fields examined (J. B. L., E. J. H.). Infection was estimated to be 10-sl. 2-mod./48 fields examined in Sask. (H. W. M.). The disease was general in Man.; infection was 7-tr. 13-sl. 8-mod. 3-sev./31 fields (W. C. McDonald). This leaf spot was scarce and only a sl. infection was seen in two 4-year-old stands, which had been left to be ploughed under (W. G. Benedict). Infection was 14-sl. 1-mod./15 fields examined in Drummond Co., Que. (R. O. Lachance). A mod. infection was general at the Station, Ste Anne de la Pocatiere, (D. Leblond) and at the Station, Charlottetown, P. E. I. (J. E. Campbell).

CROWN BUD ROT (Rhizoctonia solani, Fusarium spp., etc.) caused sl. -mod. damage in 28 fields in s. Alta.; the disease develops rapidly after the first season of growth (E. J. Hawn).

STEM ROT (Sclerotinia sclerotiorum). Sclerotia were reported in samples of seed from Nipawin, Tisdale and Saskatoon, Sask. (H. W. Mead).

LEAF SPOT (Stemphylium botryosum) is most noticeable in September in Essex and Kent counties, Ont., when sl. -mod. infections are present in most fields (W. G. Benedict).

RUST (Uromyces medicaginis). Sl. -mod. infections were recorded in Sept. -Oct. in 21/33 fields examined in s. w. Ont.; the heaviest infection seen was in Gosfield North Twp., Essex Co. (W. G. Benedict).

CROWN WART (Urophlyctis alfalfae). A sl. infection was found at the Station, Saanichton, B. C., on creeping alfalfa strains developed at Swift Current. The disease was previously reported in B. C. at Vancouver (R. Turley, W. Jones).

MOSAIC (virus). A trace was found in 4 widely separated fields in Essex Co., Ont. (W. G. Benedict).

RING SPOT (virus). A tr. was seen in one 2-year-old field in Essex Co., Ont. (W. G. B.).

WITCHES' BROOM. Infection was mod. in a field n. of Grimshaw, Alta. (J. B. Lebeau).

YELLOW S (boron deficiency) was less sev. than usual in Kamou--raska Co., Que.; precipitation had been heavy. In Drummond Co., the disorder was present but difficult to identify. In the Lake St. John district, Dr. G. J. Ouellet reported that the severest symptoms were observed at the Station, Normandin, on clay soil which had been over limed and showed a pH of 7.4 Red clover was also sev. affected. He also observed

yellows on sandy soil about Peribonka and Mistassini (R. O. Lachance).

WINTER INJURY was sev. in the plots at Saskatoon, Sask., in which plants were killed over large areas (H. W. Mead).

### COMMON CLOVER

LEAF SPOT (Cercospora zebrina). Infection was sl.-mod. in 15/28 fields of red clover examined in s.w. Ont. The disease was present in one- and two-year-old stands in the fall, but was more severe in the latter (W. G. Benedict).

ANTHRACNOSE (Colletotrichum graminicola) sev. infected Altaswede red clover at Ste Anne de la Pocatière, Que. (R. O. Lachance).

SOOTY BLOTCH (Cymadothea trifolii). Infection was so heavy on alsike clover in the greenhouse at Harrow, Ont., to constitute a pest especially on plants growing under crowded conditions (W. G. Benedict). Mod. infections were noted on alsike clover in single fields at Kentville, N.S. (D. W. Creelman) and at Hunter River, P. E. I. (J. E. Campbell).

POWDERY MILDEW (Erysiphe polygoni). Infection was 2-sl. 2-mod. 1-sev. /25 fields of red clover and 1-tr. /8 fields of alsike clover examined; affected fields were all in central Alta. (J. B. L.). At Lethbridge a sl.-mod. infection was noted on Lasalle red clover (M. W. C.). Powdery mildew was sl.-mod. on 12/28 fields in s.w. Ont.; it was generally more prevalent on 1st year growth (W. G. B.).

LEAF SPOT (Gloeosporium spadiceum). Most plants of red clover were affected in a field at St. Clement, Rivière du Loup Co., Que. (D. Leblond, D. B. O. Savile). This appears to be the first time the pathogen has been observed in Eastern Canada (I. L. C.).

ANTHRACNOSE (Kabatiella caulivora). Infection of 4-54. 7-sl. 1-mod. 6-sev. /25 fields of red clover examined in n. and central Alta. (J. B. L.) and sl.-mod. in a stand at Lethbridge (M. W. C.).

LEAF SPOT (Leptosphaeria pratensis). Infection was tr.-sl. in 2 fields of alsike clover in central Alta. (J. B. L.).

LEAF SPOT (Pseudopeziza trifolii). Tr.-sl. infections were general on red clover throughout Kings Co., N.S. (D. W. Creelman).

LEAF SPOT (Stemphylium sarcinaeforme). A heavy infection caused defoliation on red clover in a hayfield at Aldergrove, B. C. in Sept. (H. N. W. Toms). Infection was 1-tr. 1-sl. and 1-mod. /25 fields in central and n. Alta. (J. B. L.). Sl.-mod. infections were recorded in 5/11 fields examined in s.w. Ont. (W. G. Benedict) and a sl. infection

at Hunter River, P. E. I. (J. E. Campbell).

RUST (Uromyces fallens) infection was tr. -mod. in 7/28 fields of red clover examined in s.w. Ont. The uredinia were frequently nerviphilous. A sl. infection (U. trifolii) was also noted on alsike clover at Sombra (W. G. Benedict). A few pustules of rust were seen on Lasalle red clover at Charlottetown, P. E. I. (J. E. Campbell).

MOSAIC (virus) affected 1-5% of the plants in 5/28 fields of red clover examined in s.w. Ont. (W. G. Benedict). Mosaic (Trifolium virus 1) affected a tr. to 3% of the plants in 5 fields in York Co., N. B. (D. J. MacLeod).

PURPLE TOP (virus) was found affecting 8 plants in a field near Fredericton, N. B. Plants were dwarfed; stems and leaves were reddened and exhibited a tendency towards phyllody. The virus was transmitted from 3 plants to Bonny Best tomato by using dodder (Cuscuta gronovii). The symptoms in the tomato resembled those induced in this host by the potato purple-top virus. (D. J. MacLeod).

An unthriftness of Ladino clover has been observed at Ste Anne de la Pocatiere, Que., for the last few years. It appears to be associated with a phyllody condition. This condition has been attributed in Oregon to infection by a virus. The affected plants die. (R. O. Lachance).

RING SPOT (virus) was observed in 3 fields of red clover in Essex Co., Ont. In one 40-acre field near Cottam, nearly every plant was affected. Aphids were present in the field but when they were caged on healthy plants in the greenhouse they failed to transmit the virus. From studies made at Harrow, it is believed that the virus in red clover is a strain of the tobacco ring-spot virus (W. G. Benedict).

WITCHES' BROOM (virus). Two plants were affected in a field near Keswick, N. B. (D. J. MacLeod).

YELLOW (Callistephus virus 1). Three affected plants were observed in a field near Fredericton, N. B. (D. J. MacLeod).

### SWEET CLOVER

GREY STEM CANKER (Ascochyta caulicola) was rated as 2-tr. 3-sl. 2-mod. /13 fields in Man.; it occurred n. and n.e. of Winnipeg and s. of Brandon (W. C. McDonald).

BLACK STEM (Ascochyta meliloti) caused sl. damage in 5 fields in the Saskatoon and Tisdale areas, Sask. (H. W. Mead). The disease was rated as 4-tr. 3-sl. 4-mod. 2-sev. /13 fields examined in Man. In the 2 sev. infected fields n.e. of Winnipeg, the infection on pedicels, seed pods, and seeds appeared to be limiting the yield of seed (W. C. McDonald).



LEAF SPOT (Leptosphaeria pratensis). Infection was 2-sl. in central Alta. (J. B. L.) and 2-tr. 6-sl. in fields generally distributed in Man. (W. C. McD.). Stagonospora leaf spot was extremely heavy in May on both yellow and white sweet clover in Essex Co., Ont.; economic loss is slight because most of the crop is ploughed under for green manure. A tr. of leaf spot was observed on the current year's growth in October (W. G. Benedict).

ROOT ROT (Phytophthora cactorum). The growing of sweet clover has been abandoned in the n. and e. parts of Essex Co., Ont. on account of the disease. In May a few sev. damaged fields were found in May in s. w. Essex Co., but some excellent stands that were disease free were also seen. (W. G. B.).

COMMON LEAF SPOT (Pseudopeziza medicaginis) was general in Man.; infection was 7-tr. 3-sl. 3-mod./13 fields examined (W. C. McD.).

MOSAIC (virus). A few affected plants were found in 4/14 fields examined in Essex Co., Ont. (W. G. B.).

RUST (Uromyces hedysari-obscuri) was very heavy on a specimen of Hedysarum mackenzii sent in for identification from Whitehorse, Yukon, by Mr. J. Y. Tsukomoto. He stated that the plant has some value as a pasture crop for horses and cattle. Moose also graze on the plant. It appears that there is some interest in developing the plant as a cultivated forage crop in the Yukon (J. A. Parmelee). It may be pointed out that the rust, which has repeating aecia in place of uredinia, occurs on the different species of Hedysarum wherever they grow across Canada and the infection is often very heavy. Unless resistant plants could be selected out from the wild population, it is very likely that rust would greatly impair its value as a forage plant in some seasons (I. L. Connors).

## B. OIL-SEED CROPS

### FLAX

As in recent years, Dr. W. E. Sackston has included his observations in an account entitled "Flax Diseases in Manitoba in 1954".

Flax was sown late throughout much of Man. and Sask. in 1954 on account of a cold wet spring. Some fields failed to mature before freeze-up. The average yield for Man. was estimated at 9 bu. per acre. Diseases were of very little consequence in most fields. In 61 farm fields of flax examined during a survey in Man. and e. Sask. 17-20 August, the crop varied from pre-bud to ripe, and was in the green-boll stage in most fields.

RUST (*Melampsora lini*). There was practically no rust on flax in the area surveyed. The worst infection observed affected 10% of the leaves in a small patch, with the field rating only "trace". Four of the 61 fields had from one or two pustules, to traces of rust. All the rest, including a number of fields of Victory and other susceptible varieties were rust free. As rust developed well in inoculated plots at Winnipeg, freedom from the disease was apparently due largely to the widespread use of resistant varieties, with a consequent reduction in inoculum. Rusted Redwing flax was submitted from Fort Vermilion, Alta., and it was reported that rust infection was extensive there on other varieties as well.

SEEDLING BLIGHT, WILT, and ROOT ROT (*Rhizoctonia solani*). Seedling blight was conspicuous in plots at Morden in June. *R. solani* was isolated from affected seedlings. Traces of wilt and root rot were found in three fields, and 3% in one field. Again *R. solani* was isolated.

PASMO (*Septoria linicola*). Traces of pasmo were found in 13 fields, 5% in 1, 10% in 1, and 35% in 1. Leaf lesions were seen in a number of fields in which stem symptoms were not observed. The disease developed well in inoculated plots at Winnipeg.

BOLL BLIGHT (cause unknown) was not yet conspicuous at the time of the survey, on account of the lateness of the crop. There was no boll blight in 31 fields, traces in 3, 5-15% in 17, and 20-30% in 10.

FLORAL DEFORMITY (?aster yellows virus). This disease, (described in P.D.S. 33:36-38), was present in all but two fields. In one of these, the plants were only 8 inches high when examined, and in the other the crop was dead ripe. Traces were found in 41 fields, 1% in 10, 2% in 2, 3% in 1, 5% in 2, and 10% in 1 (late, reseeded). Specimens of the disease were brought in by farmers, and one was submitted from Lacombe, Alta.

MISCELLANEOUS. Severe damage from wind and soil drifting was reported from one field in Man. Top Discoloration affected a few plants in two fields, and 15% of one, all in light soil areas. Seedlings with symptoms resembling Heat Canker were submitted from an irrigated field near Tilley, Alta.

Prof. T.C. Vanterpool, University of Saskatchewan, Saskatoon, likewise contributed a special report on "Flax Diseases in Saskatchewan in 1954".

The moist, cool growing season was favourable for flax and yields were again above average. The estimated average yield was 10.3 bu. per acre or 5,317,000 bu. on 518,000 acres. Also, the area in flax was increased by 176,000 acres over last year's and was about equal

to the combined acreage in fall and spring rye. This increase in flax acreage was partly due to the late spring and partly to the fact that flax was not under a delivery quota.

In general, flax diseases were inconspicuous until late in the season when *Alternaria* blight and pasmo appeared widely scattered in the wooded and semi-wooded areas. *Phoma* foot rot has rarely been found under field conditions in Saskatchewan, but this year four fields showing slight amounts were found in north-central areas. Although stem and leaf rust of cereals was epidemic, flax rust was severe only on the few fields sown to susceptible varieties. Flax yellows, which was conspicuous in many areas last year, appears to be widespread and was sent in by farmers for the first time. Eight samples were received from localities as far apart as Estevan in the s. e. and Meadow Lake in the n. w. In the aggregate, losses from flax diseases were much less than one would have expected with the abundant rainfall.

RUST (*Melampsora lini*) was sev. on susceptible varieties, which are no longer recommended, but virtually absent on rust-resistant varieties. Thus, although stem and leaf rust were epidemic on cereals, the same could not be said for flax rust in spite of the fact that the season favoured flax rust development. Once again rust-resistant varieties have saved flax growers a great deal of money. Two instances may be cited which emphasize this point: (1) Some plots of Royal grown in rotation plots at the University became heavily infected with rust in the early seedling stage and were completely destroyed when the season was about two-thirds over; (2) in 1953, a farmer e. of Watson, grew Royal on fallow and obtained 27 bu. per acre on his first attempt at growing flax. In 1954 he sowed another fallowed field with his 1953 seed; this field became so heavily rusted that at the end of August he swathed his flax and later burnt it. There is now definite evidence that under certain conditions, spray or dust applications of 2,4-D may increase appreciably the damage caused by flax rust on susceptible varieties. Three such fields have been seen and similar claims have been made by several farmers. Stem Canker (*Melampsora lini* followed by *Fusarium* spp.) was very conspicuous on susceptible varieties (Dakota and Royal) at Scott, Saskatoon and Watson.

WILT (*Fusarium oxysporum* f. *lini*). No samples of wilt were sent in. Low temperatures kept the damage low in the Wilt Nursery.

SEEDLING BLIGHT (*Rhizoctonia solani*) was less prevalent than usual. In plots on fallow at the University where seedling blight has been troublesome in the last few years, it was present in sl.-mod. amounts in scattered spots. Cool, wet conditions do not favour the disease.

BROWNING and STEM BREAK (*Polyspora lini*). The relative scarcity of the disease during such a moist, cool season as 1954 is



difficult to explain as these conditions were thought to favour its occurrence. Only 4 reports worthy of note were recorded; these were one each at Wakaw, Saskatoon and Netherhill, and at Hilda, Alta. On account of wet weather no survey was possible in the n. e. Sask. where this disease is usually present.

YELLOW (aster yellows virus, California strain) was found in all flax fields examined during a survey in September in an area extending from the Quill Lakes w. through Saskatoon to Rosetown and s. to Elrose. Infection ranged from a trace (two plants in a field at Kyle) to 5% (in a field w. of Kenaston). All experimental work to date points to the trouble being caused by the western strain of the aster yellows virus. Many of the fields most heavily infected with yellows were not sprayed with 2,4-D and were a quarter of a mile or more from the nearest sprayed fields. These observations and the fact that 2,4-D spraying has been general since 1947 rule out spray injury as a cause. This point is mentioned because 2,4-D injury on some plants is quite similar to yellows on the same plants. Flax yellows is widespread over the province, being found in areas as far apart as Tisdale (n. e.), Kyle (s. w.), Estevan (s. e.) and Meadow Lake (n. w.). The fact that 8 samples were sent in by farmers for the first time indicates that it is becoming conspicuous in many fields. Scarlet flax (Linum grandiflorum) and other species of Linum became naturally infected in experimental plots. Yellows has not yet been observed on wild flax (Linum lewisii) but this species was not grown with the others in the plots.

BASAL STEM ROT (Phoma spp.) Previously, foot rots caused by Phoma spp. have only rarely been encountered, but a form that causes sev. damage to germinating flax seed was known to be present in some years in the moister areas. This form, which is regarded as P. exigua, has been under study for some time. This year 4 fields, one each at Dafoe, Saskatoon, Asquith and Vanscoy, showed Phoma pycnidia in small numbers on the basal portion of plants also affected with pasmo. The Phoma pycnidia appear to be later or slower in maturing than the pycnidia of Septoria linicola. This fact has made isolation difficult with the material on hand. Observation over the last 15 years indicate that though highly pathogenic Phoma spp. may be thinly scattered over the moister areas. Normal conditions are too dry and perhaps too warm to favour their development. It appears that a succession of moist, cool years are necessary to ensure a build up of inoculum and widespread outbreaks of the disease.

BLIGHT (Alternaria linicola) appeared late in the season about the same time as pasmo in n. central Sask. where it caused stem, leaf and boll browning. Its distribution more or less coincided with that of pasmo, and both diseases frequently appeared on the same plants. Some 15 low-germinating flax-seed samples were secured from the Plant Products Seed Laboratory, Saskatoon, and tested for seed-borne fungi.

Five of these were heavily infested with A. linicola, one moderately and seven slight. Fusarium spp. and undertermined fungi were present in trace amounts, while no Septoria linicola or Polyspora lini appeared on the plates. It is difficult to assess the damage done to a ripening flax crop by A. linicola, but its effect on reducing the germination of seed samples is easily determined and is often considerable.

PASMO (Sphaerella linorum (Septoria linicola) was found this fall considerably further west than previously reported, probably as a result of the moist, cool weather prevailing throughout the season. In the few fields examined in the semi-wooded areas in n.-central Sask. around Saskatoon and as far w. as Scott pasmo was present in every one. The disease, however, appeared late in the season and, although it caused considerable stem discoloration in many fields, it seems to have had little effect on the filling of the seed. This view was also held by Mr. A. Kusch, Experimental Station, Scott. Pasma was not found in flax around Rosetown nor in areas further south and west. It will be of interest to observe its distribution during the next few years. Many plants affected with pasmo also showed stem discoloration caused by Alternaria linicola (see above).

CHLOROSIS (lime-induced). This condition, which was favoured by the cold, wet spring, was found in spots in two fields near Asquith in which the trouble had not been previously observed. The plants recovered as the season advanced.

#### Other Observations

ANTHRACNOSE (Colletotrichum lini). A tr. infection was observed on Rocket and Stormont Gossamer L. 26 in the plots at Ottawa, Ont. (Mary E. Elliott).

WILT (Fusarium oxysporum f. lini) caused sev. damage to fibre flax at Ste Martine, Que., according to L. A. Cabana, Field Husbandry Division, Ottawa; the identity of the organism was confirmed by W. L. Gordon (M. E. E.). Wilt caused sev. damage in the variety plots at the Station, Ste Anne de la Pocatiere, Que.; some plots were so sev. damaged that they were not harvested. Av. infection in 4 replicates was: Cascade 39%, Stormont Gossamer L. 26 50%, Liral Dominion and Stormont Curies 73%, Wiera 75% and Liral Prince 80% (R. O. Lachance).

A browning of the stems affected 50-75% of the plants of Rocket, Stormont Gossamer and Liral Prince in the plots at Ottawa, Ont. Only Fusarium spp. developed on the stems when they were placed in a moist chamber (M. E. E.).

RUST (Melampsora lini) infection was 10-tr. 12-sl. 7-mod. 5-sev./46 fields examined. Most of the 30 fields examined in the Peace River area were infected (W. P. C., J. A. H. and A. W. Henry). Rust

was tr. -sl. on Liral Prince and sl. -mod. on Stormont Gossamer in the plots at Ottawa, Ont. (M. E. E.).

BROWNING and STEM BREAK (Polyspora lini). Browning infection was 3-tr. 6-sl. /30 fields examined in the Peace River area, (W. P. C.) and a tr. of stem break was seen in a field at Vauxhall in s. Alta. (J. S. H.).

ROOT ROT (Pythium sp.). A tr. was found in a field at Creston, B. C. (J. S. Horricks).

ROOT ROT (Rhizoctonia sp.) Damage was 2-tr. 2-sl. /14 fields examined in s. Alta. (J. S. H.).

#### PEPPERMINT

RUST (Puccinia menthae). A sl. infection was observed in the University plots, Vancouver, B. C. (H. N. W. Toms). Rust was abundant on cultivated peppermint at the school farm, Deschambault, Que. in mid-September. The rust was parasitized by Darluca filum (D. Leblond).

#### RAPE

WHITE RUST (Cystopus candidus) caused sev. distortion of the tips of the branches and curling and flattening of the stems in a few fields s. e. of Prince Albert, Sask.; oospores were abundant on the affected parts (T. C. Vanterpool).

DOWNY MILDEW (Peronospora parasitica) was common on rape in the Shellbrook area, Sask. where it has occurred for several years. It caused mod. damage in 10/15 fields. It causes a distortion of the panicle and no seed are formed on the affected parts (H. W. Mead).

STEM ROT (Sclerotinia sclerotiorum) was found causing mod. damage in 12/15 fields in Sask. Stems were bleached and soft and they usually contained sclerotia. Plant infected early set no seed. (H. W. Mead). Argentine rape was affected in plots at Arborg and Teulon, Man. At Arborg estimated infection was 1-5% over most of the plot area but it was 30-60% in a group of 6 sev. lodged plots, in which hemp nettle (Galeopsis tetrahit) was present. At Teulon infection was 2%. A local farmer, who sowed rape for the second year on the same land, stated that an appreciable portion of his crop resembled the infected plants in the Teulon plots (B. R. Stefansson, W. E. Sackston).

STERILITY (?aster yellows virus). Plants showing the symptoms described in 1953 (P. D. S. 33:41) were found in the plots of Argentine rape at Winnipeg and Altona, Man. (W. E. Sackston). Aster yellows was also found in the plots at Saskatoon, Sask. Unlike the description



of Sackston these plants had been bent over almost flat by rain and wind. Abnormal branches which were green and upright, had formed; the leaves were folded around the aborted inflorescence into bladder-like structures. Nearby weeds were also affected by yellows (H. W. Mead, T. C. Vanterpool).

### SAFFLOWER

LEAF SPOT (Alternaria carthami Chowdhury, J. Indian Bot. Soc. 23:64. 1944) was observed on the leaves of many safflower plants in the Cereal Division plots, Ottawa, Ont. At first the spots were small, circular, yellowish-brown to brown. These spots tended to coalesce into elongate spots, which were a centimeter long when the plants were mature. The fungus was isolated from the spots. From the dimensions of the spores, the organism was identified as A. carthami Chowdhury rather than Macrosporium carthami Rodighin (cf. R. A. M. 19:115-116. 1940) (Mary E. Elliott).

GREY MOULD (Botrytis cinerea). Some of the heads of plants in the Cereal Division plots, Ottawa, Ont. were found to have turned brown. Affected heads placed for 2 day in a moist chamber consistently yielded B. cinerea (M. E. E.).

RUST (Puccinea carthami) was well established in the plots at Lethbridge, Alta., by mid-July. By the end of September infection was mod. on Indian, N8, and N6 x N8; sl.-mod. on N10, 2377, and 4033; sl. on 3614; and tr. on W.O. 14 (F.R. Harper, M.W. Cormack). Rust infection was uniformly heavy on safflower plants in the University plots at Winnipeg, Man. Seed for these plots came from the University of Saskatchewan, Saskatoon. Other plots, 20 feet away, sown to the same variety with seed grown at Winnipeg were relatively free of rust. Likewise, the safflower plots at the Morden Station, were almost free of rust except for several rows sown with seed from Saskatoon (W. E. Sackston). These observations confirm previous ones that the rust is largely spread from place to place by spores on the seed or debris with the seed. It would seem to be a simple matter to control the rust by treating the seed with a suitable fungicide (I. L. C.).

ROOT ROT (Pythium sp.) caused sl. damage in irrigated plantings at Lethbridge, Alta. A number of lines from the University of Saskatchewan appear highly resistant (F. R. H.).

HEAD BLIGHT (Sclerotinia sclerotiorum) was noted on all varieties under irrigation at Lethbridge, Alta. Damage was sl.-mod. on N10, N6 x N8, and 2377 (F. R. H.).

## SOYBEAN

Dr. A. A. Hildebrand has summarized his observations in "Diseases of Soybeans in southwestern Ontario in 1954".

The disease situation in soybeans in s.w. Ont. in 1954 was characterized by (a) a decline in the severity and incidence of stem canker, (b) the appearance of an apparently important new disease, (c) an accentuation of physiologic disorders, and (d) the effects of a protracted mid-season drought, July being the driest month on record for most of the area.

STEM CANKER (Diaporthe phaseolorum (Cke. & Ell.) Sacc. var. caulivora (Athow & Caldwell, Phytopath. 44:328. 1954). As early as 4 Aug. dead or dying spurs and petioles were noted on the lower stem of Blackhawk plants. By 24 Aug. Lincoln plants similarly affected were common. From plants of both varieties isolates of the pathogen were readily obtained. Despite an inoculum potential similar to that of previous years, the disease this season was much less destructive than usual. In other years plants have been attacked and killed by mid-August, and often as the season advanced the disease increased in intensity, seriously lowering the quality and yield of seed. This year no plants were found dead before 1 Sept. On 15-16 Sept., when a survey of commercial fields in Essex Co. was carried out, stem canker was found affecting not over 8% of the plants. It was noted also that, in general, loss of yield was slight because infection had occurred too late or had progressed too slowly to affect seriously seed production. Another factor in the lower incidence of stem canker was the very much reduced acreage of the two highly susceptible varieties Blackhawk and Hawkeye.

Towards mid-September in three different years counts were taken of the incidence of stem canker in 5 commonly-grown varieties. The results are briefly summarized below.

<u>Variety</u>	<u>Percentage Incidence of Stem Canker</u>		
	<u>1951</u>	<u>1952</u>	<u>1954</u>
Harman	3.5	8.7	Trace
Harosoy	4.5	5.7	Trace
Lincoln	9.9	18.5	8.0
Hawkeye	15.2	26.1	
Blackhawk	24.3	54.7	

From these data Harman and Harosoy appear highly resistant, Blackhawk highly susceptible, and Lincoln mod. susceptible to stem canker. However, the resistance of Harman and Harosoy is more

apparent than real, because when 150 plants of each of these two varieties and of Blackhawk in adjacent rows in the laboratory plots were inoculated on 11 Aug. by the toothpick method with a highly pathogenic isolate of D. phaseolorum var. caulivora, every plant of all three varieties was killed. No explanation can be offered for the escape of Harman and Harsoy under conditions of natural infection.

SUSPECTED NEW DISEASE (cause unknown). On July 12, attention was called to a field of Lincoln soybeans in which the rows were becoming appreciably thinner on account of wilting and dying of the plants. Investigation disclosed that the collapse and death of plants had been occurring since they first emerged as seedlings. Most of the affected plants showed a more or less extensive lesion on the stem at ground level; the roots were not affected. On 15 July diseased specimens showing identical symptoms were received from the Woodslee area in Essex county. The Woodslee material was the first of a series of diseased soybean specimens that finally constituted the largest number to be received at the laboratory in a single season. Specimens were received from points as far n. as Petrolia in Lambton Co., and as far w. as St. Thomas in Elgin Co.

All specimens were alike in having lesions on the lower stem. The lesions varied in size and appearance. When sometimes the epidermis was dried and depressed, the lesions resembled those of fire blight on young apple and pear twigs. Others were gray or distinctly brown in colour. Internally there was a correspondingly wide variation in symptoms, which ranged from a faint grey or brown streaking in the woody tissues to disintegration and marked discoloration of the tissues as seen in stems affected with brown stem rot.

Many of the fields from which specimens had been received were visited. In some instances the disease was more prevalent in the lower parts of the field; in others, although many plants were dead or dying in the rows, no pattern was apparent. The disease is unique in that killed plants continue to collapse and die throughout the season. No estimate of losses was made, but they must have been appreciable. In a 26-acre field of Harsoy where a careful count was made over 20% of the stand was affected. All of the commonly-grown varieties seemed equally susceptible.

Isolations were made from a considerable number of specimens. Among the organisms obtained, species of Botrytis and Fusarium and an unidentified phycomycete predominated. Their pathogenicity remains to be investigated.

GREY MOULD (Botrytis cinerea). On 10 Aug. a gray mould was observed on the stems of a considerable number of plants growing in the laboratory plots. The mould enveloped the stems for about 2 inches above the ground level. Its presence could have been easily overlooked. Infected Lincoln and Blackhawk plants continued to be found, although less frequently until the end of August. Infected plants appeared to be



little injured. Only two references on the occurrence of Botrytis on soybeans were found in the literature. H. Pape (Gartenflora, 70(3-4): 48-50, 1921) reported in Germany a species of Botrytis that evidently first attacked young pods and later infected the main axis of the stem. Lobik (V.I. Bull. North Caucasian Plant Prot. Sta., Rostoff-on-Don, 1930, 6-7, p. 285) reported Botrytis attacking a variety of soybeans in the North Caucasus. Whether the Botrytis on the plants in the laboratory plots is related in any way to the new disease reported in the previous section is not known.

BUD BLIGHT (virus). In the course of selecting for inoculation soybean plants in the laboratory plots at Harrow it was found that the roots of some of the plants pulled up for discard were infested by mealybugs, which were subsequently identified at Ottawa to be the grape mealybug Pseudococcus maritimus (Ehrh.). It also appeared that the mealybugs had only recently spread from the roots of red clover in adjacent plots. Further observations provided circumstantial evidence that bud blight infection was in some manner correlated with the mealybug infestation 1/

#### PHYSIOLOGICAL DISEASES

(a) Manganese Deficiency as usual was prevalent over large areas in Kent and Essex counties. Damage was sl. - sev.; in some fields returns from the crop would not suffice to meet costs of production. On account of its economic importance a considerable acreage is sprayed each year with manganese sulphate. The chemical is applied at widely different concentrations and with a variety of equipment. 2/

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1/ For a fuller account of the occurrence of Mealybugs and of Grey Mould on soybeans in Ontario see A. A. Hildebrand and N. R. Boyce (Plant Dis. Repr. 39(2): 171-173, 1955).

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2/ Growers are advised to spray their crop with manganese sulphate as soon as the symptoms appear. When the deficiency is first evident the leaf blades turn a light green except the veins, which remain a dark green. Later the leaf tissue turns a golden yellow while the veins still remain green. The disease occurs mostly in clay soils and sometimes on muck; it is worse in some years than others. A popular proprietary material is Tecmangan, which contains 70% manganese sulphate as well as ammonium and magnesium sulphate. According to Dr. Hildebrand he recommends a minimum of 6 lb. of the material per acre. The amount of water may be varied (20-50 gal. per acre), depending on its availability. In the Soya-Bean Newsletter Vol. 2, No. 7, July 8, 1954, 3-4 lb. of manganese sulphate and 2 cups of liquid Orthex are recommended for each 40 gal. of water. Apply 8-10 lb. of the sulphate per acre, at a spray pressure of 125 lb. Dr. Hildebrand has recommended that farmers leave an unsprayed strip in their fields in order to observe the benefit. With most growers an application of manganese sulphate has become a standard cultural practice. Spraying of course only protects the current crop. (I. L. C.).

(b) Potassium Deficiency was observed in several fields, more especially in those in which heavy crops of corn had been produced last year, and to which no fertilizer was added before soybeans were planted this year.

Several other diseases were noted now and then throughout the season, but they caused only slight damage and warrant only brief mention. Brown Stem Rot (Cephalosporium gregatum) attracted attention this year only late in the season. On 16 Sept. almost all the plants in a field of the variety Adams were found to be infected. Adams on the average matures one day earlier than Lincoln. The effect of the disease was to cause Adams to appear to have matured much in advance of Lincoln. A similar instance was reported in 1950 (P. D. S. 30:41). Phyllosticta Leaf Spot (Phyllosticta sojaecola) produced the typical tatter-leaf symptoms for a short time early in the season, and threatened to become serious in a large field of Lincoln. On 25 June the foliage of almost every plant in this field was infected. The infection did not spread however, and in a short time new growth had hidden the diseased leaves.

#### Other Observations

BACTERIAL BLIGHT (Pseudomonas glycinea) or possibly Bacterial Pustule (Xanthomonas phaseoli var. sojensis) was rather prevalent in the University plots at Winnipeg, Man. late in the season. No laboratory check was made on the material (W. E. Sackston).

#### SUNFLOWER

Dr. W. E. Sackston has again contributed a special report on "Sunflower Diseases in Manitoba in 1953".

Sunflowers were sown on about 20,000 acres in Man. in 1954, compared with 5,000 acres in 1953. Weather conditions were unfavorable in 1954 and diseases were more destructive than in the last two seasons. The estimated average yield per acre was down to 650 pounds of seed. Fifty fields were examined for disease, seven of them 27 July and the rest during a survey covering most of the sunflower area, 7-10 Sept. Most of the fields examined were 2-3 weeks from maturity at the time of the survey. Dr. E. D. Putt, Experimental Station, Morden, and Mr. L. E. Siemens, Coop. Vegetable Oils, Altona, assisted in the survey.

RUST (Puccinia helianthi), was not found in the 5 fields examined 27 July. In September rust was a trace in 11 fields, 1-5% in 24, 10-15% in 5, 20-25% in 4, and 40% in 1. The rust percentages were based on the infections on the mid-leaves of the plants. Lower leaves carried more rust, and the upper leaves less. Infections were read on the Advance hybrid, and on the Sunrise and Mennonite varieties. In crossing blocks and mixing fields, where S:17-388, the female parent of Advance,

occurred, it was rusted more heavily than Sunrise, and inbred plants in Advance fields also showed much more rust than the hybrid. Infections on S37-388 were 30-60% in fields where Sunrise or Advance showed only 5-10% rust. Plantings of the Synthetic M-1 variety, grown in two-acre plots in farm fields of Advance, showed only traces to 5% rust, even where Advance was fairly heavily rusted. Rust was present on sunflowers in plots at Melita, but not at Indian Head, Sask.

Pycnial infections of rust were found on volunteer sunflower seedlings in the Morden area in mid-June and near Winkler in July, but were not noticed elsewhere. Rust infections developed well in inoculated plots at Winnipeg and at Morden. In one farm field in which there were only traces of rust 27 July, the mid-leaves averaged 25% rust 8 Sept.

WILT (*Sclerotinia sclerotiorum*). Twenty fields were apparently free of wilt. Traces of the disease were found in 26 fields, and 1%, 5%, 10%, and 40% of wilt, in 1 field each. The 40% infection occurred in the same field or in an adjacent one which had 20% wilt in 1950.

Several mid-stem infections, apparently initiated by air borne ascospores, were observed in farm fields and experimental plots. Head and neck rot caused by *Sclerotinia* was seen on three or four plants.

DOWNY MILDEW (*Plasmopara halstedii*) infections were more prevalent and sev. in the main sunflower area than in any previous year. Traces were found in only one "outlying" field. Traces of the disease were found in 8 fields, 1-5% in 2, 6-10% in 3, 15-20% in 2, 30% in 1, and 95% in 1 (of 20 acres extent, which was plowed down). All infections were systemic; no secondary leaf infections were seen. About 5% of the plants were stunted by mildew infection in a "permanent" sunflower plot at Winnipeg, where the disease was observed for the first time in 1953 (on about 1% of the plants). Mildew was conspicuous in one replicate of a nursery in the University plots at Winnipeg, but was difficult to find in the rest of the nursery, located on higher, drier ground. The increase in mildew infection seems to be associated with the high moisture of the last two years.

Differences in varietal reaction to downy mildew have been observed previously; S37-388 appeared more susceptible than Sunrise, in crossing blocks. The Synthetic M-1 variety appeared much less susceptible than Advance hybrid growing beside it in farm fields in 1954.

Symptoms strikingly similar to those induced by herbicides, such as 2,4-D, were observed on a number of plants stunted by systemic infections of downy mildew. Distortion and rugosity of the leaves of mildewed plants has been observed frequently, but the "2,4-D" pattern of venation and distortion had not been noticed before. The other symptoms characteristic of systemic downy mildew infections made confusion of the two conditions quite unlikely.

LEAF MOTTLE (cause unknown). The leaf mottle condition first observed in 1948 (P. D. S. 28:32) was prevalent and sev. in the central



sunflower area. Traces were found in only 3 fields outside the main area. Mottling was a trace in 8 fields, 1-5% in 3, 25-35% in 3, 50% in 1, and 65% in 1. According to Mr. L. E. Siemens, yields from some of the fields with high percentages of mottle were only 200-300 lbs. per acre, contrasted with 500-600 lbs. per acre from nearby fields, or relatively unaffected portions of the same fields. Vascular discoloration was noted in all the mottle plants which were examined. Stalk Rot and Black Jelly-Rot (P. D. S. 29:35, P. D. S. 31:38) were present in trace amounts in four fields in which leaf mottle was severe. No stalk rot was found in the field with 65% mottle. In this same field, or one adjacent to it, there was 5% mottle in 1949 in mid-August, and 5 to 10% stalk rot in mid-September.

FLORAL DEFORMITY (?aster yellows virus), first described in 1953 (P. D. S. 33:47), was widely prevalent on sunflowers in Man. Traces of the deformity were found in 22 fields, 1% in 3, 3% in 1, and 5% in 1. It was present in plots at Melita, Manitoba, but not at Indian Head, Sask., although symptoms attributed to aster yellows virus were conspicuous in flax plots near the sunflowers. The condition was just as noticeable in outlying fields as in the main sunflower area. The Synthetic M-1 variety seemed to be more subject to this disorder than Sunrise, which was more susceptible than the Advance hybrid. It was not recognized on the S37-388 inbred.

MISCELLANEOUS. Traces of damage from drift of 2,4-D herbicide, applied variously by ground rigs and by aircraft, were seen in 8 fields. Severe damage was observed in 3 fields. A wilting, cause unknown, of three to four leaves, below the apical whorl subtending the sunflower head, was observed in a number of plots and in some farm fields. Black Stem, observed in 1953 at Altona, in a plot sown to sunflowers repeatedly, (P. D. S. 33:47), was not seen there in 1954. Head Drop was present in trace amounts in 13 fields, and in experimental plots. Black flecks on sunflower stems, identical in appearance with the early symptoms attributed to virus infection in Argentina, were found in 7 farm fields, 4 of the Mennonite variety, 2 of Synthetic M-1, and 1 of Advance. Similar flecking in experimental plots at Winnipeg was more conspicuous on the Synthetic M-1 and M-3 varieties, than on Sunrise and Advance. Hail damage was severe in a number of fields, and in plots at Winnipeg. Common dodder was observed on sunflowers for the first time, in an isolated field surrounded by bush.

#### Other Observations

The new rust resistant variety, Synthetic M-1 mentioned above yielded well in tests at Morden, Man. in 1954. On land where the plants were artificially inoculated with sunflower rust average yields per acre of sunflower seed was Synthetic M-1, 1946 lb., Synthetic M-3, 1375 lb., Advance 472 lb., and Surprise 610 lb. On land where the plants were not

inoculated, the corresponding yields were 1951 lb., 1574 lb., 1024 lb., and 907 lb. respectively. These results indicate that Synthetic M-1 is highly resistant to rust, a fact of considerable importance to the sunflower oil industry in Man. (T.M. Stevenson).

### C. ROOT CROPS

#### MANGEL

LEAF SPOT (Cercospora beticola) infection was mod. -sev. in the plots at the Station, Charlottetown, P.E.I. (J.E. Campbell).

#### SUGAR BEET

LEAF SPOT (Phoma betae). Tr. infections were observed in 2 fields near Taber (F.R.H.).

BLACK ROOT (various fungi). All 44 fields examined after emergence in s. Alta. showed damage by black root. An average of 53% of the seedlings were infected and 3% were sev. damaged or killed. Phoma betae was found in 59% of the fields, Rhizoctonia solani in 49%, Pythium spp. in 39% and Aphanomyces cochlioides in 17%. No damage was observed in the fields later in the season or in storage piles in October (F.R. Harper).

### D. MISCELLANEOUS CROPS

#### CORN

RUST (Puccinia sorghi). A tr. was found on all hybrids in Essex and Kent counties, Ont. (N.J. Whitney) and about Charlottetown, P.E.I. (R.R. Hurst).

STALK ROT (Pythium and Fusarium spp.) caused considerable damage to corn inbreds at the Station, Harrow, Ont. In s.w. Ont., stalk root was found in most fields of hybrid field corn. Damage ranged from sl. to sev. (N.J.W.).

ROOT ROT (Pythium and Fusarium spp.) often caused sev. damage to hybrids and inbreds of field corn in Essex, Kent and Lambton counties, Ont. (N.J.W.).

SMUT (Ustilago maydis) was found frequently on hybrid corn in s.w. Ont.; infection ranged up to 50% and averaged about 5% (N.J.W.). A single affected ear was noted in field corn at Charlottetown, P.E.I. (R.R. Hurst).

## MUSTARD

WHITE RUST (Cystopus candidus) sev. infected a few plants in fields at Milk River and Vauxhall, Alta. (M. W. Cormack). A sev. infection occurred on black mustard in the Botanical Garden, Montreal, Que. (P. Duval).

## SUDAN GRASS

LEAF SPOT (Colletotrichum graminicola) was found in the laboratory plots at Edmonton, Alta. (W. P. C.).

## CULTIVATED AND OTHER GRASSES

### AGROPYRON-Wheat Grass

Ergot (Claviceps purpurea). Collections were made in Alta. as follows:

one on A. cristatum near Drumheller, 7 on A. dasystachyum, 27 on A. repens, 16 on A. smithii, 22 on A. subsecundum, and 3 on A. trachycaulum n. e. of Edmonton (W. P. Campbell). Ergot infection on A. repens was tr. - mod. in roadside stands near St. Catharines, Ont. (T. R. Davidson) and was heavy at La Have, Lunenburg Co., N.S. (D. W. Creelman). A sl. infection was seen on couch grass in the cereal plots at Monticello, P. E. I. (J. E. Campbell).

Powdery Mildew (Erysiphe graminis) was heavy on A. repens at Riverport, Lunenburg Co., N.S. (D. W. C.).

Head Smut (Ustilago bullata) infected 10% of the heads of A. trachycaulum in the plots at Lethbridge, Alta. (M. W. Cormack).

Stem Smut (Ustilago hypodytes). A tr. infection was found in one stand of A. repens at St. Catharines, Ont. (T. R. Davidson).

### AGROSTIS

Ergot (Claviceps purpurea). A collection of ergot was made on A. alba near Barrhead, Alta., and another on A. exarata near Fort St. John, B. C. (W. P. Campbell).

Leaf Rust (Puccinia rubigo-vera) was heavy on A. tenuis at Broad Cove, Lunenburg, Co., N.S. (D. W. Creelman) and light on A. stolonifera in a fallow field at Gaspe, Que. (D. Leblond).

### ALOPECURUS

Leaf Spot (Mastigospirium album) was again sev. on A. pratensis in the same field at Wolfville (not Kentville as reported in P. D. S. 33:50), where it was first found in 1953. It has not been found elsewhere in the province (D. W. Creelman). It may be noted that M. album was reported on meadow foxtail growing near Ithaca, N. Y., in June 1954. (Plant Dis. Repr. 38:607-608, 1954) (I. L. C.).



## ARRHENATHERUM

Ergot (Claviceps purpurea). A collection was made on A. elatius near Fort St. John, B.C. (W.P. Campbell).

## BROMUS - Brome Grass

Ergot (Claviceps purpurea): 56 collections were made on B. inermis in Alta.; 2 were also made on B. ciliatus near Fort St. John, B.C. (W.P.C.).

Leaf Rust (Puccinia rubigo-vera). A mod. infection was observed on some plants of B. tectorum at St. Catharines, Ont. (T.R. Davidson).

## CALAMAGROSTIS

Ergot (Claviceps purpurea): 22 collections made on C. canadensis in Alta. (W.P. Campbell).

Crown Rust (Puccinia coronata) was generally present in Lunenburg Co., N.S., but infection was sl. (D.W. Creelman).

## DACTYLIS GLOMERATA - Orchard Grass

Ergot (Claviceps purpurea). A mod. infection was noted in 3 stands at St. Catharines, Ont. (T.R. Davidson).

Downy Mildew (Sclerophthora sp.) was found sporulating on leaves in rod rows of the grass at Saanichton in February. The fungus was also fruiting on the grass in a 12-acre field at Sumas in November. The grower claimed that yield of grass grown for ensilage was materially reduced. The fungus appears to be undescribed. (W. Jones).

Brown Stripe (Scolecotrichum graminis) mod.-sev. infected a few plants in the nursery at Lethbridge, Alta. (M.W. Cormack). It caused mod. damage to the leaves of orchard grass at Kentville, N.S.; it appears to be quite common on this grass each fall (D.W. Creelman).

Rust (Uromyces dactylidis). Uredinia and telia abundant in test rows at Saanichton, B.C. (W. Jones).

## ELYMUS

Ergot (Claviceps purpurea): 24 collections were made on E. inovatus in the Peace River area, Alta., and one near Edmonton (W.P. Campbell).

Powdery Mildew (Erysiphe graminis). A mod. infection was noted at Fort Vermilion, Alta., on E. junceus (J.B. Lebeau).

## FESTUCA - Fescue

Ergot (Claviceps purpurea). A single collection was made on F. rubra at Fort St. John, B.C. (W.P. Campbell).

Common Root Rot (Helminthosporium sativum and Fusarium spp.) caused sl. damage to creeping red fescue at Olds, Alta. (J.B. Lebeau).

## GLYCERIA

Ergot (Claviceps purpurea) was collected on G. borealis n.w. of Lloydminster, Alta. (W.P.C.).

## PHLEUM PRATENSE - Timothy

Ergot (Claviceps purpurea): 14 collections were made on timothy in Alta. (W. P. C.). A tr. infection was noted in a planting at St. Catharines, Ont. (T. R. Davidson).

Anthrachnose (Colletotrichum graminicola) caused 25-50% infection in a low field at St. Tite, Laviolette Co., Que. (D. Leblond).

Stem Rust (Puccinia graminis var. phlei-pratensis) caused mod. damage in a stand at Petite Riviere, Lunenburg Co., N.S. (D. W. Creelman).

Eye Spot (Selenophoma donacis) was found on a few plants at St. Clement Riviere du Loup Co., Que. (D. L.).

## POA

Ergot (Claviceps purpurea) was collected once on P. pratensis near Edmonton, Alta. (W. P. C.).

Powdery Mildew (Erysiphe graminis). A sl. infection was observed on Marion blue grass near Beaverlodge, Alta. (J. B. L.). The disease was mod. -sev. everywhere on P. pratensis in Que. (D. Leblond).

Leaf Rust (Puccinia poae-nemoralis) caused a sl. infection on Merion blue grass (P. pratensis) near Beaverlodge, Alta. (J. B. L.; I. L. C.).

## SETARIA GLAUCA

Smoot (Ustilago neglecta). A tr. infection near Fonthill, Ont. (T. R. Davidson). Many Ont. records (D. B. O. Savile).

## SPARTINA

Rust (Puccinia sparganioides) was heavy on both S. pectinata and S. patens in the coastal areas of Lunenburg Co., N.S. (D. W. Creelman)

## STIPA VIRIDULA

Ergot (Claviceps purpurea). One collection made n. w. of Lloydminster, Alta. (W. P. Campbell).

## TURF

Brown Patch (Rhizoctonia solani). Several patches were present on a green of a golf course at Charlottetown, P. E. I. (J. E. Campbell).

Blackening (Symploca muscorum (Ag.) Gom.). From a city lawn in Vancouver, B. C. showing severe blackening a small patch of turf was sent by I. C. MacSwan. The black threads or growths on the grass proved to be colonies of a blue-green alga. The alga was identified as Symploca muscorum by Elwyn O. Hughes, National Research Council, Ottawa. The usual habit is given as "amongst mosses, on moist earth, or in greenhouses". It would appear that the lawn had suffered from excessive moisture (I. L. Connors).

### III. DISEASES OF VEGETABLES AND FIELD CROPS

A special report entitled "Vegetable Disease Survey of the Holland-Bradford Marsh, 1954" prepared by Dr. O. T. Page, Department of Botany, Ontario Agricultural College, Guelph, forms an admirable preface to the section. Considerable concern is felt over the possibility that the club root organism may have been widely distributed as a result of flooding in October 1954.

According to a survey of the Holland-Bradford Marsh conducted by Mr. K. W. Hunter in 1954, 94% of the area (6,745 acres) was planted to 5 vegetable crops. These crops were: lettuce (1870 acres), carrots (1317 acres), onions (1427 acres), potatoes 1289 (acres) and celery (442 acres). The muck soil on which the crops are grown overlies peat of either sedge-grass or woody origin.

On 15 Oct. 1954 the entire area of the Bradford Marsh was inundated to a depth of 1-8 feet in the wake of hurricane Hazel. The marsh was again completely drained within a month after flooding. It is anticipated that the dissemination or destruction of inocula of several pathogens will be reflected in crop losses in 1955. An estimate of the amount of certain crop diseases observed in 1954 is presented along with some comparisons of disease losses in 1953 and 1952.

#### Carrot

Soft Rot (Erwinia carotovora). More than 90% of both harvested and unharvested carrots covered by flood water in October were affected.

Yellows (virus). Between 40 and 50% of the roots examined in one field (C. B. Kelly and O. T. Page) in the Springdale area of the Bradford Marsh exhibited proliferation of the fibrous roots and adventitious chlorotic shoots.

#### Cauliflower

Club Root (Plasmodiophora brassicae) was first observed in one field on the Bradford Marsh in 1953. In 1954 approximately 15% of the cauliflower plants in another field on the same farm were infected (O. T. Page and C. B. Kelly). The effect of flooding in October 1954 on the possible dissemination of this disease organism from a localized area will be investigated in 1955.

#### Celery

Bacterial Blight (Pseudomonas apii). A trace was found on the Horticultural Experiment Substation in early September. This disease was moderately severe in several acres of the Bradford Marsh in 1953.



Pink Rot (Sclerotinia sclerotiorum). A trace was observed on celery in a large storage in Bradford in December.

Late Blight (Septoria apii-graveolentis) was prevalent on late storage celery in all fields examined in early September. The severity of the disease in fungicide-dusted fields emphasizes the need for a critical evaluation of application techniques used by growers on the Bradford Marsh.

### Lettuce

Root Rot (Botrytis cinerea) was reported by MacNeill (Plant Dis. Repr. 37:618-619. 1953) to have affected in some instances more than 80% of the crop in 1952 and 1953. In 1954 this disease was again severe, particularly in fields in which lettuce followed lettuce.

Downy Mildew (Bremia lactucae). A trace was observed in most fields examined in August.

Aster Yellows (virus) affected more than 50% of the plants in some fields in 1953. The disease has proved difficult to evaluate because the severity of the symptoms varied from plant to plant. The time of infection is one factor which undoubtedly influenced this variation. Growers were urged to dust their crop regularly with DDT in 1954 upon emergence of the seedlings. The amount of yellows was very sharply reduced in both DDT-treated and untreated fields. It is estimated that less than 10% of the plants were infected in fields examined.

### Onion

Purple Blotch (Alternaria porri). A trace was observed in one field examined.

Neck Rots (Botrytis allii and Botrytis squamosa). A trace of gray-mould neck rot (B. allii) was found in several lots of yellow bulb onions examined in storage in January 1954. White bulb onions which appear sporadically in fields of yellow bulb onions invariably were infected with the small sclerotium neck-rot organism (B. squamosa).

Leaf Spot (Botrytis spp.). A trace to 5% of this leaf spot caused by B. squamosa was present in 7 fields examined in 1954. It was reported by Page (Plant Dis. Repr. 37(10):513-514. 1953) to be severe in 1953, affecting 100% of the plants examined in widely separated fields.

Downy Mildew (Peronospora destructor). With one exception, over 90% of yellow bulb onion plants examined in mid-August were affected by downy mildew. One 13-acre field (Wm. Watson) sprayed regularly with a carbamate spray exhibited less than 10% infected plants.

Leaf Mould (Stemphylium botryosum) occurred concomitantly with downy mildew and was responsible for the black mouldy appearance associated with downy mildew injury in 1954.

Smut (Urocystis cepulae) was introduced into the Ansoveld area of the Bradford Marsh between 1944-1946. The spread of this disease has been followed by surveys conducted in 1952-53-54. Smut is now generally prevalent in that part of the Bradford Marsh between Highways 11 and 400. Counts of diseased seedlings varied from 0 to 55% in 15 fields selected for examination. In 5 fields examined west of Highway 400, a high incidence (50%) of diseased seedlings was found in a restricted area in one field.

### Potato

Late Blight (Phytophthora infestans) was severe in some fields of the Bradford March by 12 Aug. Several fields of Canso potatoes showed severe foliage symptoms in late August.

Silver Scurf (Spondylocladium atrovirens) was present on more than 75% of certified seed potatoes examined in a large storage in Bradford in the spring, 1954. The severity of this disease increases in storage and results in reduction of commercial grade. It is of particular concern to growers who market washed potatoes in polyethylene bags.

### ASPARAGUS

RUST (Puccinia asparagi). Sl. infection in the laboratory plots, St. Catharines, Ont. (J. Townshend).

### BEAN

GREY MOULD (Botrytis cinerea) caused considerable loss to beans during early harvest in B. C. A pod rot, which started after the pods were picked but before the beans were delivered to or before they were processed at the cannery, continued to be troublesome as long as the wet weather continued. Grey mould also caused heavy defoliation with reduction in yield in many plantings during September (I. C. MacSwan). Only trace amounts were seen in early pickings about Canaan, N.S. There was some damage later when the plants suffered injury from wind and rain (K. A. Harrison). Grey mould caused sl. -mod. damage, particularly to the margins and tips of the leaves of Pencil Pod at York, Queens Co., P. E. I. Later it caused sl. amount of pod rot in the same planting (J. E. Campbell).

ANTHRACNOSE (Colletotrichum lindemuthianum). Diseased specimens received from Swift Current, Sask. (R. J. Ledingham). Infection was sl. -sev. in plantings, mostly of wax beans, at Baie St. Paul, about Lake St. John and

at Larouche, Que. (L. J. Coulombe). Infections in gardens was tr.-mod. about Quebec City and along the Lower St. Lawrence (D. Leblond). A mod. infection was present on samples received from Ste Catherine, Portneuf Co., (H. N. Racicot). A 40% infection was found in 2 garden patches at Salisbury, Albert Co., N. B. (S. R. Colpitts). Anthracnose completely destroyed a garden planting of Davis White Wax at Kentville, N. S. and was also prevalent on Black Seeded Pencil Pod in another garden. It was not reported from the canning areas in N. S. (K. A. H., D. W. Creelman). Anthracnose was quite general and often serious in P. E. I. (J. E. Campbell). Mod. infection was noted in a garden at Topsail and in one at Brigus, Nfld.; sev. infected specimens were received from Burin (G. C. Morgan).

DRY ROOT ROT (Fusarium solani f. phaseoli) was evident in all fields of Michelite examined in s. w. Ont.; Robust was also infected. The disease was most sev. in fields on sandy loam and in one on heavily manured soil. Infection ranged from 5 to 80%. Amount of damage was not estimated as the crop suffered from severe drought and nitrogen was deficient in some fields (R. N. Wensley).

HALO BLIGHT (Pseudomonas phaseolicola) was unusually scarce in s. Alta.; sl. infections were noted in a few gardens and 2 fields (M. W. Cormack). The disease was extremely sev. about Edmonton, where the worst outbreak in many years occurred (L. E. Tyner, W. P. Campbell). A 100% infection caused sl.-sev. damage to a block of Clipper at Ottawa, Ont. (R. V. Clark). One small lot of seed planted in the Canaan area, N. S., showed scattered infection areas. Most growers had good seed and suffered no loss. There is only one large grower left in the area, but he has had good crops for the last 2 years (K. A. Harrison). A light infection was present on a late planted crop at York, P. E. I. (J. E. Campbell).

Halo Blight and Common Blight (q. v.) were common and caused mod. damage in gardens in Saskatoon, Sask. (R. J. Ledingham).

STEM ROT (Sclerotinia sclerotiorum) was heavy late in the season in gardens in Saskatoon, Sask.; the attack came too late to affect yields noticeably (T. C. Vanterpool). A garden patch was reported to be sev. infected at Magog, Que.; diseased specimens were received (H. N. Racicot, Constance Bowerman). A trace of rot was seen in a basket of picked beans at Canaan, N. S. (K. A. H.).

RUST (Uromyces appendiculatus). For the first time since 1948 bean rust appeared in B. C. in September; it was sev. on Blue Lake 65 in the Abbotsford, Matsqui and Sumas districts. As a result of defoliation reduction of crop was common. Blue Lake 231 and Ferry Morse #1 were also affected but not as heavily as Blue Lake 65 (I. C. MacSwan). A tr. of rust was seen on Kentucky Wonder in a small garden at Kentville, N. S.



(K. A. H.) and on Pencil Pod at Charlottetown, P. E. I. (R. R. Hurst).

COMMON BLIGHT (Xanthomonas phaseoli) was heavy on a block of Clipper at Ottawa, Ont. (R. V. Clark). Infection was sl. -sev. in gardens about Quebec City and on the lower St. Lawrence, Que. (D. Leblond), and about Lake St. John (L. J. Coulombe). A trace was seen in a garden on Golden Wax Improved at Charlottetown, P. E. I. (R. R. H.).

MOSAIC (virus). A tr. was present in an acre field of Round Pod Kidney Wax and in a block of Clipper at Ottawa, Ont. (V. R. Wallen, R. V. Clark) and in a garden at Sillery, Que. (D. Leblond). Yellow mosaic (Phaseolus virus 2) was found on Kentucky Wonder beans in 4 gardens in Fredericton, N. B.; infection was 2-5%. The infected plants were growing near gladioli that showed a faint mottling (D. J. MacLeod). A 25% infection was observed in a planting of Kentucky Wonder at Kentville, N. S.; when this variety is grown near gladioli 20-30% of the bean plants become infected with mosaic that kills the bean plant before the crop matures (K. A. Harrison). Seed stocks of Ace and Yellow Eye grown at the Experimental Station were rogued 2 years ago, but 20% of the plants are again infected (K. A. H.).

### BEET

LEAF SPOT (Cercospora beticola). A tr. was observed in one garden at Rougemont, Que. (R. Crete), and in one at Kentville, N. S. (D. W. Creelman). Leaf spot was general and infection was heavy in many gardens in Charlottetown, P. E. I. (R. R. Hurst).

DAMPING-OFF (Rhizoctonia solani) almost completely destroyed late plantings in 2 gardens at Harrow, Ont. (C. D. McKeen).

SCAB (Streptomyces scabies). Infection was very sl. in a garden in Queens Co., P. E. I. (R. R. Hurst); mod. in 2 small plots at Topsail and sl. in 3 fields at Clarkes Beach, Nfld. (G. C. Morgan).

SEEDLING BLIGHT (various organisms). Around Montreal, Que., seedling blight is always serious in early seedings of beets intended for transplanting. Soil treatment with Arasan 3 oz. per each 6' x 12' bed has given excellent control (E. Lavallee).

INTERNAL BLACK SPOT (?boron deficiency) was noted in one field at Clarkes Beach, Nfld. (G. C. Morgan).

### BROAD BEAN

CHOCOLATE SPOT (Botrytis cinerea) was mod. -sev. on the leaves at Larouche and St. Jerome, Que. (L. J. Coulombe). It was also sev. at Ste Foy (D. Leblond).

WILT (Fusarium oxysporum f. fabae) was found causing tr. -sev. infections in plantings in gardens and fields along the north shore of the St. Lawrence River, e. of Que. and about Lake St. John; in one 1/4 acre field, 60% of the plants were affected and yield would be low (L. J. Coulombe).

MOSAIC (Pisum virus 2). Four plants showing sev. mosaic were found in a garden in Fredericton, N. B. (D. J. MacLeod). Tr. was seen in a garden at Murray Bay, Que. (D. Leblond).

### BROCCOLI

SOFT ROT (?Erwinia carotovora) was general in plantings throughout the lower mainland, B. C., and caused sev. loss to many growers; one grower estimated that 75% of his crop was lost from a 5-acre field (I. C. MacSwan).

CLUB ROOT (Plasmodiophora brassicae) sev. affected about 10% of the plants in the laboratory plots, St. Martin, Laval Co., Que. (E. Lavallee).

### BRUSSELS SPROUTS

SOFT ROT (?Erwinia carotovora) caused some rotting in a 2 acre field at Aldergrove, B. C.; loss was sl. (I. C. MacSwan).

### CABBAGE

GREY MOULD (Botrytis cinerea) was found on 2 plants in plots at Ste Foy, Quebec Co., Que. in September; rarely seen on cabbage in the field (D. Leblond). The disease sev. infected about 200 bags of cabbage under poor storage conditions at St. John's, Nfld. (G. C. Morgan).

SOFT ROT (Erwinia carotovora) affected 5 plants of Penn State in a 1/10 acre plot at Ste Clothilde, Que. (V. R. Wallen). The disease affected an occasional head in a garden at Charlottetown, P. E. I. (R. R. Hurst). It also sev. affected 25% of the heads of imported cabbage in a wholesale warehouse at St. John's, Nfld.; shipment had previously suffered from frost (G. C. Morgan).

YELLOWWS (Fusarium oxysporum f. conglutinans) was sev. in 1 1/2-acre field at Merrickville, Ont. (H. N. Racicot). Yellowws was again present in cabbage on a St. Vincent de Paul farm. Damage was less on account of the cool season and the growing of somewhat resistant varieties. The disease was found on a second farm, which is on Cote St. Luc, Montreal Island; damage sl. (E. Lavallee).

CLUB ROOT (Plasmodiophora brassicae). A grower at Fort William,

Ont. , reported that he had been unable to raise any cabbage for the last 3 years on account of the disease; affected specimens received (H. N. R.). Club root was present in many fields on Isle Jesus, Que. , but the plants were less injured than usual on account of the cool wet weather that prevailed throughout the season (E. Lavallee). The disease was present in a 2-acre field at the Ste Clothilde Station in a steckling crop of Danish Ballhead (V. R. Wallen). A tr. was noted in a small garden at Kentville, N. S. (D. W. Creelman). Club root affected 20 % of plants in a field in Queens Co. , P. E. I. ; infection took place from the compost soil used in flats for starting the seedlings (J. E. Campbell). Infection was very sev. in 3 fields at Clarkes Beach and sl. -mod. in many fields in Conception Bay, Nfld. (G. C. Morgan).

WIRE STEM (Rhizoctonia solani) was present as usual in early cabbage, cauliflower and turnip seedlings on Isle Jesus, near Montreal, Que. ; losses are often 100 %. Treating the soil with Arasan 3 oz. , or Brassical 8 oz. per 6' x 12' bed has given excellent control (E. Lavallee). Head rot caused by R. solani caused considerable damage at Terrace in the Skeena Valley, B. C. ; mycelium permeated the tissues (W. Jones, W. R. Foster).

BLACK ROT (Xanthomonas campestris) was quite prevalent in a field at Birds Hill, Man. On 11 Aug. leaves and stalks showed vascular discoloration and on 23 Nov. the harvested crop was deteriorating rapidly. My informant stated that the seed had been imported by a local seed company (W. A. F. Hagborg).

OEDEMA (excess water) was general in a garden at Carleton-by-the-Sea, Que. in late June (D. Leblond).

### CARROT

GREY MOULD (Botrytis cinerea). Several affected roots were seen in the Marketing Board warehouse, Victoria, B. C. The roots were grown at Gordon Head (W. Jones). About 10 % of the Nantes carrots in storage at Waterville, N. S. , were destroyed by March. Grey mould is much slower in developing than some storage rots but in all lots of roots held for some time in storage it is from year to year one of the most important causes of loss (K. A. Harrison).

SOFT ROT (Erwinia carotovora) affected about 25 % of the plants in a 1/10 acre plot of Amsterdam at Ste Clothilde, Que. (V. R. Wallen).

ROOT ROT (Phytophthora megasperma Drechsl.) was general in a 2-acre field on muck soil at Matsqui, B. C. Decay began as a slight darkening mostly near the tip of the tap root. Flesh was rather dull and firm but watery under pressure. The fungus was isolated and the oogonia and antheridia obtained resembled those of P. megasperma,



which has been reported on carrots from Tasmania. The grower stated that he would have to discontinue growing carrots unless he can control the trouble (I. C. MacSwan, W. Jones).

**VIOLET ROOT ROT** (*Rhizoctonia crocorum*). A 100% infection was obtained in the check plots in an experimental area on Thedford Marsh, Ont. In commercial plantings in the Marsh, the disease was present in almost every one, but infection did not exceed 15%. Wherever it occurred the roots were sev. damaged (N. J. Whitney).

**SCLEROTINIA ROT** (*S. sclerotiorum*) was sev. in carrots in storage from a garden at Saskatoon, Sask., where bean plants were attacked late in the season (T. C. Vanterpool). In the same lot found affected by grey mould (q. v.) at Waterville, N. S., about 5% of the roots were attacked by Sclerotinia rot (K. S. H.). This disease was causing sl. damage to carrots in storage at Charlottetown, P. E. I., on 28 Dec. (J. E. Campbell).

**NEMATODES** (*Meloidogyne* sp.) were found in a few fields at St. Martin, near Montreal, Que.; damage was mod. (E. Lavallee).

**YELLOW**s (*Callistephus virus 1*). Sl. infections were observed in fields at Barnwell and Medicine Hat, Alta. (F. R. H.) and in gardens in Edmonton. Affected dandelions were noted in the laboratory plots at Edmonton (W. P. C.). It affected 8-12% of the carrots in a farm garden at Wimmer, Sask. It was fairly prevalent elsewhere (T. C. Vanterpool). Yellows affected about 25% of the plants in 2 fields examined near St. Catharines, Ont. (T. R. Davidson). In a variety test of 20 varieties in the laboratory plots at Harrow, marked differences were noted in the percentage of plants affected by yellows. The 4 heaviest infections were: Chantenay 10.1%, Woodruff's Coreless 10.9%, Long Orange Improved 11.2% and Oxheart 13.9%. In the Thedford Marsh, infections up to 10% were present (N. J. Whitney). Yellows affected about 10% of the plants in a 1/2 acre planting in Lincoln Co. (J. K. Richardson). Tr. infections were noted on Amsterdam in small plots at Ottawa, Ont., and Ste Clothilde, Que. (V. R. Wallen). Yellows was observed in most carrot fields on Isle Jesus, near Montreal. Percentage of infection was 1-10%, the higher percentages being on the borders of the fields (E. Lavallee). Infection ranged from a tr. to 8% in 8 fields examined about Kingsclear and Maugerville, N. B. (D. J. MacLeod). Less than 1% of the carrots were affected in a 2-acre field at Waterville, N. S. (J. F. Hockey). Yellows appeared to be more general this season than usual in P. E. I. Dr. F. MacEwen (Entomology) reported infections of 20, 30 and 50% in plantings visited. Leaf hoppers were very numerous in these fields (J. E. Campbell). Yellows was noted in a few fields at Clarkes Beach, Nfld. (G. C. Morgan).

**ROOT RUSSET** (cause unknown). At Pine Ridge, Man., carrot roots were found to be normal in shape and size, but were blemished by

large rusty spots on the surface. Injury believed not to be due to mineral deficiency or caused by insects. Growers have noticed the condition for several years (J. E. Machacek).

### CAULIFLOWER

CLUB ROOT (Plasmodiophora brassicae) affected 25% of the plants in a field at York, P. E. I.; seedlings apparently became infected from the compost soil in which the seed was sown (J. E. Campbell).

BLACK ROT (Xanthomonas campestris). In an acre planting in Lincoln Co. Ont., where there was a sl. general infection, about 10% of the tied heads showed severe leaf infection originating in injuries caused by the cord (J. K. Richardson).

WHIPTAIL (molybdenum deficiency) was so sev. in a 3-acre field at St. Martin, Laval Co. Que., that the crop had to be plowed up (E. Lavallee). A few plants showed mod-sev. symptoms in a market garden plot at Southport, P. E. I. Whiptail is general in cauliflower plantings in market gardens both in Charlottetown and Summerside. In certain plantings the crop would have been a complete failure without the addition of sodium molybdate either in a soil or spray application (J. E. Campbell).

### CELERY

EARLY BLIGHT (Cercospora apii). Several plantings of Utah celery were visited at Burlington, Ont., 12 July; about 5% of the plants were infected in one, with lesser amounts in the others (J. K. Richardson). Although C. apii has been previously reported by Mr. Richardson on green pascal celery, its identification was only confirmed when specimens were submitted this year (I. L. C.). A mod. infection was found in 2 neighboring fields of 6 acres at St. Martin, Que. (E. Lavallee).

VIOLET ROOT ROT (Rhizoctonia crocorum) occurred in a few fields on the Thedford Marsh, Ont.; infected plants were few, but these were sev. damaged (N. J. Whitney).

LATE BLIGHT (Septoria apii-gravolentis) was again general on Isle Jesus, near Montreal, Que., but it was more sev. than usual because bad weather hampered dusting operations (E. Lavallee).

NEMATODES (Pratylenchus spp.). In most celery fields surveyed on the Thedford Marsh, Ont. nematodes were causing a root rot in 80-100% of the plants. In one 20-acre field, the crop was almost a total loss (W. B. Mountain, N. J. Whitney).

MOSAIC (cucumber mosaic virus). A few plants were found infected in a field in Wentworth Co., Ont.; the identity of the virus was established by inoculation of Nicotiana glutinosa and tobacco (J. K. Richardson).

YELLOW (Callistephus virus 1, western strain) was observed in 6 plantings of green pascal varieties in Wentworth Co. Ont.; growers stated that the disease was much more prevalent than in 1953 (G. C. Chamberlain). Yellows affected 3% of the plants in the plots at St. Catharines (J. K. Richardson) and 2% in a field near Mauderville, N.B. (D. J. MacLeod).

### CUCUMBER

LEAF SPOT (Alternaria tenuissima) was general on many varieties at Kentville, N.S., by the end of the season (K. A. Harrison).

GREY MOULD (Botrytis cinerea) was found causing a stem rot in a few greenhouses around Leamington, Ont., in May. Little damage resulted because it was successfully controlled (C. D. McKeen).

SCAB (Cladosporium cucumerinum). Diseased specimens were received from North Bay, Ont.; according to the grower, the cucumber crop in the district has been sev. damaged by disease in the last two years (H. N. Racicot). Scab was general in fields on Isle Jesus, near Montreal, Que.; frequently 15-25% of the crop was lost. In field tests, 16% of the cucumbers were affected in the untreated plots while 4% were infected in plots sprayed 4 times with captan (E. Lavallee). Scab almost completely destroyed 2 acres of pickling cucumbers at Hampton, N.B.; it also caused sev. damage (45-60% infection) in 2 fields at Mauderville (D. J. MacLeod). An early crop of Straight Eight escaped damage but a late crop was completely destroyed at The Narrows (S. R. Colpitts). Scab was unusually abundant in gardens in late summer about Kentville, N.S. Fields of pickling cucumbers were planted to resistant varieties and were free of the disease (K. A. Harrison). Scab was heavy on Straight Eight in a market garden at York, P. E. I. (J. E. Campbell).

BACTERIAL WILT (Erwinia tracheiphila) affected and destroyed up to 3% of the plants in several fields in s. Essex Co., Ont. (C. D. McKeen). A few affected plants were observed in the plots at Ste Clothilde, Que. (R. Crete). Wilt recurred in tr. amounts in a few crops of pickling cucumbers in Kings Co., N.S. (K. A. Harrison).

POWDERY MILDEW (Erysiphe cichoracearum) was as prevalent in greenhouse crops in Essex Co., Ont., this year as in any of the last three. Regular applications of Karathane have kept the disease from becoming destructive. Karathane smokes are outstandingly effective against powdery mildew. (C. D. McKeen).



WILT (Fusarium equiseti) affected about 1% of the plants in a field in Kings Co., N.S. The organism was isolated from the base of the wilted plants, but it seemed probable that the organism was secondary following injury by fertilizer (K. A. Harrison).

STEM CANKER (Phomopsis sp.) A sl. infection occurred in one greenhouse crop at Leamington, Ont., in July. By lowering the greenhouse humidity the disease became less prevalent and caused less damage as the crop matured (C. D. McKeen).

ANGULAR LEAF SPOT (Pseudomonas lachrymans) was unusually prevalent in s. Alta. this year. Infection was sl. -mod. on the leaves and tr. -sl. on the fruit at Barnwell, Taber and Moose Jaw. Infection was reported to be sev. and the late-maturing fruit a total loss in a sprinkler-irrigated field at Scandia (F. R. H., M. W. C.).

DOWNY MILDEW (Pseudoperonospora cubensis). About 50 beds of cucumbers were affected with a loss of 25% of the crop at Ste Dorothee, near Montreal, Que. In this district downy mildew often develops at the end of June and generally is so sev. that the balance of the crop is destroyed in about a week (E. Lavallee).

DAMPING-OFF (Pythium ultimum) caused sl. -mod. losses in several greenhouse and field crops in Essex Co., Ont., until 10 days after transplanting (C. D. McKeen).

MOSAIC (virus) was rather common in gardens at Saskatoon, Sask.; damage was sl. The disease is usually of rare occurrence in Sask. (R. J. Ledingham). About 1-1.5% of the plants were affected by mosaic (Cucumis virus 1) in 3 fields inspected about Maugerville, N.B. (D. J. MacLeod). Mosaic affected 3 plants of White Spine in a small garden planting at Kentville, N.S., to which it may have spread from nearby gladiolus. No mosaic was seen in several large fields (K. A. Harrison).

RING SPOT (virus, unidentified strain) affected a few plants in many greenhouse crops in Essex Co., Ont. There is strong evidence that the virus is seed-borne. The virus is intolerant of high temperatures and causes little damage in the summer months, but plants infected during the winter months are severely stunted (C. D. McKeen).

CRACKING and GUMMOSIS (cold night temperatures). In mid-July when the temperature fluctuated from 70°F. in the daytime to 35°F. at night for 2 consecutive nights in Essex Co., Ont., cracking of the skins with gummosis was sev. on field-grown cucumber fruits; the affected fruit were unmarketable. The condition disappeared when normal night temperatures returned (C. D. McKeen).

FOOT and ROOT ROT (cause unknown) was again sev. in greenhouse

crops in Essex Co., Ont., where the soil was not sterilized before the crop was planted. The disease begins as a root rot (C. D. McKeen).

### EGGPLANT

DAMPING-OFF (Rhizoctonia solani). Seedlings and young plants were destroyed in a greenhouse at Harrow, Ont.; contaminated pots proved the source of the infection (C. D. McKeen).

### HORSERADISH

LEAF SPOT (Ramularia armoraciae) was heavy on a few plants in a garden at Rimouski, Que. (D. Leblond).

### LETTUCE

GREY MOULD (Botrytis cinerea) mod. infected plants grown for seed in a low area at Saanichton, B. C. (W. Jones). The disease caused 5% loss to much of the lettuce grown on muck in Chatauguay Co., Que. (E. Lavallee). Grey mould was quite general in the Annapolis Valley, N. S. Loss was usually 3-4% of the crop, but in one planting 20% was destroyed (K. A. Harrison).

DOWNY MILDEW (Bremia lactucae). In May some 12 beds of lettuce were destroyed by downy mildew at Ste Dorothee, Que. In August, most lettuce plantings around Montreal were sl. infected; the infection was mostly on the lower leaves, which had to be trimmed away before the heads were marketed (E. Lavallee).

ANTHRACNOSE (Marssonina panattoniana) heavily infected the lowest leaves of a few plants in a small planting at Leamington, Ont. (C. D. McKeen).

RUST (Puccinia extensicola). A few infections were found on 2 plants in a home garden at Saskatoon, Sask. (T. C. Vanterpool).

BOTTOM ROT (Rhizoctonia solani) destroyed about 6% of the plants in one field at Leamington, Ont. (C. D. McKeen).

DROP (Sclerotinia sclerotiorum). A few plants grown for seed were killed at the Station, Saanichton, B. C. (W. Jones). A tr. to 1% of the plants were affected in lettuce fields in Kings Co., N. S. (K. A. Harrison).

BIG VEIN (virus). Specimens received from the Montreal district, Que., showed the typical symptoms of big vein (H. N. Racicot).

YELLOW (Callistephus virus 1) was found affecting 2% of the plants in a field at Mangerville and 6% in a garden at Kingsclear, N. B. (D. J. MacLeod). Yellows caused 30% damage to lettuce in a field at Grand Pre,

N. S. This disease, locally known as "white heart" is the most sev. disease affecting the fall crop. It is rarely observed in the spring crop (K. A. Harrison).

MOLYBDENUM DEFICIENCY. A case of suspected molybdenum deficiency was seen causing mod. damage to a fall crop of lettuce in a market garden at Southport, P. E. I., where the soil must be treated with sodium molybdate to produce a crop of cauliflower. The lettuce plants were yellow and the heads were not developing properly (J. E. Campbell).

### MELON

LEAF SPOT (Cladosporium cucumerinum) was mod. in a garden at St. Apollinaire, Lotbiniere Co., Que. (D. Leblond).

ANTHRACNOSE (Colletotrichum lagenarium) caused sl. loss in a 2-acre field at Harrow, Ont.; the first-formed fruits were sev. spotted (C. D. McKeen).

BACTERIAL BLIGHT (Erwinia tracheiphila) was reported on melons in a small garden at Napierville, Que. (R. Crete).

POWDERY MILDEW (Erysiphe cichoracearum) appeared in most fields in the Harrow-Leamington area, Ont., by mid-August; varietal resistance was noted (C. D. McKeen).

WILT (Fusarium bulbigenum var. niveum). This soil-borne disease has greatly limited the acreage in s. Essex Co., Ont., that may be cropped to susceptible varieties; resistant varieties are now being grown (C. D. McKeen).

DAMPING-OFF (Pythium ultimum) destroyed 10% of the zucca melon plants set in a 2-acre field at Harrow, Ont. (C. D. McKeen).

MOSAIC (virus). An early infection wiped out all 6 melon plants in a garden at Kentville, N. S.; infection was apparently from a sev. affected volunteer gladiolus (K. A. Harrison).

### MUSHROOM

GREEN MOULD or VERDIGRIS (Myceliophthora lutea Constantin). A grower in Surrey, B. C., estimated that he suffered a reduction of crop, valued at \$1800, caused by infection by Myceliophthora and Fusarium sp. (I. C. MacSwan). Green Mould appears to be a new disease in Canada (I. L. C.).



## ONION

NECK ROT (Botrytis allii) affected all bulbs of a yellow variety in a market sample at Quebec received in January (D. Leblond).

FUSARIUM ROT (F. spp.) affected 1-3% of the plants in one 8-acre field of Sweet Spanish in Essex Co., Ont.; in 9 fields examined on the Leamington Marsh, a tr. -1% was found in one. High summer temperatures favoured the disease. (R. N. Wensley).

DOWNY MILDEW (Peronospora destructor). In 1/10 acre plots of the Horticultural Division, Ottawa, Ont., infection was: Yellow Globe Danvers #44, tr. -sev. on 75% of the plants; Mountain Danvers tr. -mod. on 100%; Yellow Globe Danvers #11 tr. -mod. on 50%, and Red Weathers-field, tr. (V. R. Wallen). By mid-August downy mildew was general and sev. in most onion fields about Montreal, Que. In fields of young onions, where the disease is always worse, the loss was 20-50% of the crop (E. Lavallee). In a 27-acre field at Sherrington, Napierville Co., the disease appeared in large patches in one corner near a neighboring bush. The average infection for the field was 10% of the plants. Applications of zineb checked the spread of disease (L. Cinq-Mars).

PINK ROOT (Pyrenochaeta terrestris, etc.) caused sl. -mod damage in 8 out of 9 farms visited on the Leamington Marsh, Ont. High soil temperatures prevailed during the growing season (R. N. Wensley).

SMUT (Urocystis cepulae) infected fields appear to be steadily increasing in the Montreal district, Que. This year 3 diseased fields were found at Ste Rose and one at Riviere des Prairies. In each field at least a third of the seedlings were killed and another third more or less affected (E. Lavallee).

YELLOWWS (Callistephus virus 1) affected 3% of the plants in a small garden patch at Kentville, N.S. (J. F. Hockey).

## PARSNIP

LEAF SPOT (Ramularia pastinacae) was heavy in a garden planting at Riverport, Lunenburg Co., N.S. (D. W. Creelman).

YELLOWWS (Callistephus virus 1). Three plants were found affected in a garden at Maugerville, N.B. (D. J. MacLeod).

## PEA

Dr. V. R. Wallen prepared a special report on "Pea Diseases in Ontario in 1954".

In 1954, 23 fields were surveyed as follows: canning peas 12, field peas 5, and garden peas 6, located in the Georgian Bay area, Prince Edward Co., about Renfrew and at Ottawa.

Leaf and Pod Spot (Ascochyta pisi) was again quite widespread but was less destructive than in 1953. Infection was a trace in 7 of the 12 fields of canning peas inspected, nil in garden peas, tr. -sl. in 2 fields of Chancellor field peas in the Renfrew area, and tr. in Valley, sl. in Chancellor and mod. in Arthur at Ottawa.

Mycosphaerella Blight (M. pinodes) was prevalent in 3 fields of canning peas in the Georgian Bay area, tr. infection in one (Dark Green Perfection) and mod. in 2 (Surpass).

Ascochyta Foot Rot (A. pinodella) occurred in tr. amounts in one field (Surpass) in Prince Edward Co.

Anthrachnose (Colletotrichum pisi), a rare disease, was found in tr. amounts in 2 fields of Surpass and one of Dark Green Perfection in the Georgian Bay area, in a field of Chancellor in the Renfrew area, and on the garden variety Selkirk at Ottawa. Infection appeared to be secondary to Mycosphaerella Blight.

Bacterial Blight (Pseudomonas pisi) infection was tr. in a field of Canner King in the Georgian Bay area and tr. -sl. in one field each of Chancellor and Valley at Ottawa.

Garden peas were rather heavily infected by Wilt and Root Rot (cause undetermined) at Ottawa. In 5 fields infection was a tr. -75% of the plants. A tr. also occurred in a field of Valley peas.

Leaf Blotch (S. pisi): infection tr. in one garden variety at Ottawa. Pea Streak (?virus) occurred in tr. amounts on Chancellor and sev. infection on Valley. Mosaic (virus) occurred in traces on Arthur and Selkirk and affected 5% of the plants of Onward.

Rust (Uromyces fabae) was present in traces on the garden varieties, Selkirk, Onward and Ottawa PE11 at Ottawa.

#### Other Observations

ROOT ROT (?Aphanomyces euteiches). Several fields were a complete loss at St. Michel and St. Eduard, Napierville Co. Que. Heavy rainfall favoured the disease (L. Cinq-Mars).

LEAF and POD SPOT (Ascochyta pisi). Infection was 5-tr. 1-sl./13 fields examined in s. Alta. (F.R.H.). The disease was observed in 2 gardens in Sask; few specimens were received (H.W. Mead). Sl. -mod. infections were seen in 5 plantings mostly in home gardens along the St. Lawrence and about Lake St. John (L.J. Coulombe). A tr. was

recorded in a garden at Charlottetown, P. E. I. (R. R. Hurst).

POWDERY MILDEW (Erysiphe polygoni) was heavy on Fenland Wonder at Kentville, N. S. ; the crop was almost mature before the disease appeared (K. A. Harrison). Traces were observed on American Wonder at Charlottetown, P. E. I. (R. R. Hurst).

ROOT ROT and WILT (Fusarium sp.) caused 30% damage in a garden at Kentville, N. S. It is a disease of small gardens in towns and villages of the area; it has not been found causing loss in fields of canning peas (K. A. Harrison).

DOWNY MILDEW (Peronospora pisi). Infection was 5-tr. 1-mod./13 fields examined in s. Alta. (F. R. H.).

BACTERIAL BLIGHT (Pseudomonas pisi). Infection was a tr. in 8/13 fields examined in s. Alta. (F. R. H.).

ROOT ROT (Rhizoctonia solani, etc.). Infection was 4-tr. 1-sl./13 fields in s. Alta. (F. R. H.).

BLIGHT and ROT (Sclerotinia sclerotiorum). Pod blight and rot was very sev. affecting 60% of the pods in a 2-acre field at Victoria Beach, Kings Co., N. S. Apothecia were readily found. About 10% were affected in adjacent fields. Additional reports of the disease were received from other districts in both Kings and Annapolis counties (J. F. Hockey).

LEAF BLOTCH (Septoria pisi). A sl. infection was observed in one field in s. Alta. (F. R. H.).

RUST (Uromyces fabae) sev. damaged pea plants in the plots at St. Jean, Que. Rust was heavy in a 10-acre field at St. Michel, but it appeared to cause little damage. It was also noticed in the plots at Rougemont (R. Crete, L. Cinq-Mars). A sl. infection was found in a small garden at St. Jerome, Lake St. John district (L. J. Coulombe). A sl. infection was found only in one small garden in Kentville, N. S. (K. A. Harrison).

MOSAIC (Pisum virus 1) affected 2% of the plants in a garden in Fredericton, N. B. (D. J. MacLeod).

#### PEPPER

DAMPING-OFF (Pythium sp. and Rhizoctonia solani). A small amount occurred in several transplanting beds at Harrow, Ont. (C. D. McKeen).

MOSAIC (virus). The infection of tobacco and cucumber mosaic observed this year in Essex Co. Ont., was the lightest in recent years.



The green peach aphid, the vector of cucumber mosaic, did not infect pepper crops in s. Essex Co. to any extent this year (C. D. McK.). Mild mosaic (*Solanum virus 2*) was found affecting 3 Golden Dawn plants in a garden at the Station, Fredericton, N. B. (D. J. MacLeod).

BLOSSOM-END ROT (non-parasitic). On account of the drought this year blossom-end rot caused much greater losses than those caused by other troubles in Essex Co., Ont. (C. D. McKeen).

### POTATO

The Plant Protection Division, Science Service, has supplied the data contained in Tables 3-6 on Seed Potato Certification. All fields entered for certification are planted with Foundation or Foundation A seed.

Although the acreage entered for Seed Potato Certification was slightly less than the previous year, the acreage that passed inspection was higher than last year when the percentage of fields passing inspection was unusually low. This year's drop in rejections was due to a slight decline in the number of fields rejected under each category. The two varieties, Sebago in P. E. I. and Ketahdin in N. B., accounted for 70 % of the acreage of seed potatoes produced. The varieties Canso and Keswick have declined rapidly in popularity since there appeared races of the late blight organism to which they were susceptible.

EARLY BLIGHT (*Alternaria solani*) was reported as follows: Infection 74-sl. 18-mod. 3-sev./556 fields inspected in B. C.; most prevalent in the Grand Forks and Okanagan areas (H. S. MacLeod), recorded in 50 (39%) of the fields in central and n. Alta.; quite prevalent and sev. on Warba (J. W. Marritt), probably commoner than usual in Sask., in areas where late blight was not prevalent (T. C. Vanterpool), sev. late in the season at Estevan (A. Charlebois); only sl. infections seen in Man. (D. J. Petty); sl. in fields of Canso and Irish Cobbler in the London district, Ont. (F. J. Hudson); rarely observed in district 2 (W. L. S. Kemp); chiefly in early crops in Dufferin and Simcoe counties in district 3 (H. W. Whiteside); infection 1-tr. 24-sl. 12-mod./51 fields inspected in e. Ont. (E. H. Peters); 242-sl. 26-mod. 2-sev./1155 fields in Que., mostly in the Lake St. John district (B. Baribeau); in a few fields chiefly of Keswick early in the season in N. B., but later obscured by late blight; no *Alternaria* tuber rot observed (C. H. Godwin); first reported in N. S. on 30 July; infection usually sl. but and mod. in a few fields of Irish Cobbler, etc.; absence of long periods of dry weather or extreme heat resulted in little early blight developing (R. C. Leyton, K. A. Harrison); infection sl. in P. E. I. (H. L. McLaren), but mod. in an early field of Irish Cobbler (J. E. Campbell); tuber rot caused 25% of the tubers in a lot of Irish Cobbler in Queens Co. to be unfit for sale in January 1954 (D. B. Robinson). Infection heavy in a field at Mount Pearl and sl. in 3 fields at Clarkes Beach, Nfld.; disease of little importance in Nfld. (G. C. Morgan).

Table 3. Seed Potato Certification: Fields and Acres Inspected and Passed in 1954

Province	Number of Fields		Fields Passed %	Number of Acres		Acres Passed %
	Entered	Passed		Entered	Passed	
P. E. I.	6,512	5,724	87.9	27,152	24,063	88.6
N. S.	276	242	87.7	512	457	89.3
N. B.	4,023	3,676	91.4	22,708	19,283	84.9
Que.	1,155	802	69.4	3,298	2,173	65.9
Ont.	679	596	87.8	1,759	1,579	89.8
Man.	121	99	81.8	480	404	84.2
Sask.	52	45	86.5	92	86	93.5
Alta.	229	204	89.1	1,023	906	88.6
B. C.	736	571	77.6	2,336	1,735	74.3
Total	13,783	11,959	86.8	59,360	50,686	85.4

Previous Yearly Totals

1953	14,411	11,875	82.4	60,173	47,706	79.3
1952	12,169	10,985	90.3	45,988	41,315	89.8
1951	12,093	10,580	87.5	46,176	40,402	87.5
1950	16,203	13,292	82.0	75,352	61,933	82.2

Acres Entered

1954 59,360

1953 60,173

Decrease of 813 or 1.4%

Acres Passed

1954 50,686

1953 47,706

Increase of 2980 or 6.2%

Table 4. Seed Potato Certification: Acreage  
Passed by Varieties, 1954

Variety	P. E. I.	N. S.	N. B.	Que.	Ont.	Man. - Alta.	B. C.	Total
Katahdin	1,846	91	13,689	168	778		30	16,602
Sebago	16,080	48	349		57		3	16,537
Irish Cobbler	3,385	65	892	126	136	32	3	4,639
Green Mountain	1,509	55	466	1,351	38	15	55	3,489
Netted Gem	60	48	196		6	834	1,316	2,460
Pontiac	450	3	1,036			131	24	1,644
Kennebec	120	78	768	346	1	30	1	1,344
Canso	439	12	530	74	109	2		1,166
Bliss Triumph	32	18	656			19		725
Russet Rural			470		59			529
Keswick	69	14	148	56	92	5	3	387
Warba	49	10	4		15	113	89	280
Chippewa	13	4	19		200		1	237
White Rose			10			10	146	166
Ontario			42		76			118
Others	11	11	8	52	12	205	64	363
Total	24,063	457	19,283	2,173	1,579	1,396	1,735	50,686



Table 5. Seed Potato Certification: Fields  
Rejected on Field Inspection, 1954.

Province	Leaf Roll	Mosaic	Ring Rot		Black Leg	Wilts	Adjacent Diseased Fields	For- eign Var.	Misc.	Total
			in field	on farm						
P. E. I.	34	181	-	-	214	25	45	165	124	788
N. S.	2	13	-	-	3	6	5	5	-	34
N. B.	15	77	96	32	40	-	12	64	11	347
Que.	5	65	96	27	69	-	34	34	23	353
Ont.	11	4	7	24	11	8	-	8	10	83
Man.	7	-	-	-	5	-	3	1	6	22
Sask.	1	-	-	-	-	-	1	-	5	7
Alta.	-	2	2	11	6	-	-	-	4	25
B. C.	54	15	-	-	12	-	10	4	70	165
TOTAL	129	357	201	94	360	39	110	281	253	1,824

Rejection as a percentage of fields:

Inspected	0.9	2.6	1.5	0.7	2.6	0.3	0.8	2.0	1.8	13.2
Rejected	7.1	19.6	11.0	5.2	19.7	2.1	6.0	15.4	13.9	100%

Table 6. Seed Potato Certification: Average  
Percentages of Diseases found in  
Fields, 1954.

Average Percentage of disease found in	P. E. I.	N. S.	N. B.	Que.	Ont.	Man.	Sask.	Alta.	B. C.
Fields entered (first inspection)									
Black Leg	.37	.09	.13	.34	.04	.23	.06	.22	.05
Leaf Roll	.07	.09	.04	.02	.04	.27	.16	.04	.12
Mosaic	.17	.32	.13	.23	.02	.01	.07	.01	.08
Fields passed (final inspection)									
Black Leg	.20	.06	.09	.13	.19	.13	.05	.09	.02
Leaf Roll	.02	.05	.03	.01	.03	.01	.09	.03	.05
Mosaic	.03	.10	.06	.04	.02	.01	.05	.01	.02

GREY MOULD (*Botrytis cinerea*) was observed in a field of Bliss Triumph at Glenmount, N.S. Grey mould regularly causes some leaf spot wherever the dead floral parts fall on the green leaves (K. A. Harrison). Grey mould attacked young plants in a late blight resistance test in a greenhouse at Laval University, Quebec, P.Q. (D. Leblond). A sl. infection appeared in a lot of Green Mountain being tuber-indexed at Charlottetown, P. E. I. (R. R. Hurst).

BLACK DOT (*Colletotrichum atramentarium*). Although the disease was not observed on the potato stems in the field, 25% of tubers in a crop of Green Mountain at Ste Anne de la Pocatiere, Que., showed sl. necrosis at the stem end at harvest. Isolations yielded *C. atramentarium*. Some seed planted on loam soil gave a sound crop (H. Genereux). The organism was isolated from some Netted Gem tubers found affected by stem-end necrosis in Kings Co., N.S. (K. A. Harrison).

BACTERIAL RING ROT (*Corynebacterium sepedonicum*) was not found in any crop grown for certification in B. C. (H. S. MacLeod). Since 30 Nov. 1953, ring rot has been found on 7 farms in 3 districts (Ladner-East Delta, Cloverdale and Kamloops), two were in 1953 crop and five in 1954 crop. In every case the amount of the disease was negligible. During 1954, infected tubers were found in 7 carlots of potatoes shipped into the Vancouver area; 3 were from Washington, 2 from Oregon, and 1 each from California and Alta. (I. C. MacSwan). Ring rot was detected in tubers received from Bella Coola, an isolated district on the west coast; in the opinion of the grower the disease had been present in the district for several years (W. R. Foster, W. Jones).

Ring rot was found in s. Alta. in 2 fields inspected, which caused the rejection of 11 other fields on the 2 farms; origin of the infection is unknown, but imported certified seed is suspected (R. P. Stogryn). No ring rot was found in fields inspected in n. Alta. (J. W. Marritt). In the 1954 provincial survey for ring rot, 631 farms comprising 7604 acres were visited and ring rot was found on 27 farms (4.3%), comprising 317 acres (4.2%). These figures represent a marked reduction in the incidence of ring rot over 1953. However, ring rot may have escaped detection in some fields on account of the exceptional poor growing conditions and the lateness of the crop especially in the Brooks and Edmonton districts, although late fields were reinspected, some more than once, to avoid missing diseased fields. In the Lethbridge area, where conditions were ideal for inspection of the crop ring rot was found on only 17 farms (6.2%), comprising 144 acres (3.7%). It is believed that the practice of providing quality seed to growers who have to dispose of their diseased stock, keeping a close check on available seed, much extension work on potato improvement among growers in each area and the regular inspection of potato shipments into the province are the factors that are keeping the incidence of ring rot to a minimum (W. Lobay).

Bacterial ring rot was present in a sample of Pontiac received from near Regina, Sask.; the grower reported 10% of the tubers affected

(A. Charlebois). Tubers infected by ring rot were found in one shipment of table stock imported from North Dakota. Only one specimen showing ring rot has been received from the 1954 crop. Probably ring rot was actually more prevalent, but its presence was obscured by late-blight tuber rot (R. J. Ledingham). Ring rot was not observed during field or bin inspections in Man. (D. J. Petty). Three fields of Katahdin were rejected for ring rot in the London district, Ont. (F. J. Hudson). None found in district 2 (W. L. S. Kemp). Ring rot was found in 3 fields in district 3; infection of Canso and Keswick in Dufferin Co. probably arose from previous infection on the farm, that in Katahdin in Simcoe Co. was attributed to the use of old bags (H. W. Whiteside). Ring rot was found in e. Ont. in a field of Katahdin, which also caused the rejection of a second on the same farm (E. H. Peters). For the 12th year the Ont. Department of Agriculture has carried out a survey for ring rot. A total of 232 cases of ring rot was reported in table stock potatoes in Ont. in 1954, compared with 186 in 1953 and 214 in 1952. The total number of fields inspected each year was approximately the same (D. S. MacLachlan).

Bacterial ring rot was found in 96 or 8.3% of the fields inspected in Que.; the disease was particularly prevalent in the n. w. district, where the disease was found in 38 or 24% of the fields inspected. Ring rot also caused the rejection of 27 fields as it occurred in other fields on the same farm (B. Baribeau). Ring rot was found in N. B. in 96 fields inspected and caused the rejection of 32 others on account of the disease occurring in table stock on the farm. The figures are an improvement over last year, but it is possible that cases of ring rot were overlooked because many fields were so badly infected with late blight by mid-Aug. that the detection of ring rot was virtually impossible (C. H. Godwin). Ring rot was not detected in N. S., although fields of late varieties entered for certification were given a third inspection and the disease was looked for in table stock in districts where it was last reported (R. C. Leyton). Although occurrence of ring rot in P. E. I. is not shown in Table 5 (I. L. C.), it was found in one field during field inspection and 15 cases were located at harvest time. One crop was also rejected because it was placed in a contaminated storage (H. L. McLaren). A similar survey to the one carried out last year in P. E. I. for ring rot is in progress this year. By 6 Jan. 1955, 26 positive cases had been found in tubers of the 1954 crop. Most of these were in Prince Co. (J. E. Campbell). A sl. infection was again noted in 2 fields in Nfld. (G. C. Morgan).

According to O. W. Lachaine, Plant Protection Division, Ottawa, bacterial ring rot can still be detected with considerable certainty in fields in which the tops have died down. The stems of plants affected by ring rot retain their green colour after the stems of healthy plants have faded. The presence of ring rot can then be confirmed by the presence of affected tubers in the hill (I. L. C.).



BLACK LEG (Erwinia atroseptica) was found in 96 (13%) of the fields inspected and caused the rejection of 12 (67 acres) compared with 13 (35 acres) in 1953 (H. S. MacLeod). Black leg was found in 65 (70%) of the fields in s. Alta.; it continues to be destructive in table-stock fields under irrigation (R. P. Stogryn). Although black leg was less serious than last year in central and n. Alta., it was found in 61 (47%) of the fields inspected and caused the rejection of 6. The disease was sl. more prevalent in Warba than Netted Gem. For the first time black leg was found in foundation stocks in the Andrew district (J. W. Marritt). In the main commercial fields, some containing 100 acres, in the Edmonton district, infection was tr. -sl. in 2 fields, 5% in 2, and 8%, 25% and 75% in one each (W. P. C.). Black leg was recorded in 25% of the fields inspected in Sask.; it caused 10% or more loss in several table stock fields at Lumsden and a 15% loss was reported by a grower in the Estevan district (A. Charlebois). Black leg was observed in 45% of the fields inspected in Man. and 5, showing 1-3.5% infection, were rejected (D. J. Petty). A sl. infection was noted in a garden at Waskada (J. E. Machacek).

In Ont., black leg was observed in several fields in the London district; in one of Sebago 4% of the plants were affected (F. J. Hudson); recordable amounts of black leg occurred in 19 fields in district 2; 2 were rejected and 4 disqualified for Foundation grade (W. L. S. Kemp); in district 3, 3 fields, seed of which was not treated, were rejected on account of black leg; most of the affected fields were in Dufferin and Simcoe counties (H. W. Whiteside); black leg was found in 16 fields in e. Ont.; the highest infections (2.8%) was in fields planted with seed from P. E. I. (E. H. Peters). Black leg was reported in 509 or 55.7% of the fields inspected in Que. and caused the rejection of 65 fields; its increased prevalence in 1954 was attributed to the wetness of the growing season (B. Baribeau). Black leg was common in some fields along the Lower St. Lawrence (H. Genereux). Black leg was prevalent in N. B. and caused the rejection of 40 fields; here also extremely wet cool weather prevailed throughout the season (C. H. Godwin). The disease sev. affected 5% of the plants in a 2-acre field of Canso at Keswick, York Co. (D. J. MacLeod). Black leg was found in 80 of the 278 fields inspected and caused the rejection of 3 in N. S.; the highest infection recorded was 7% (R. C. Leyton). Black leg continues to be a problem in P. E. I., where 214 fields were rejected (H. L. MacLaren). The disease was less sev. than usual in Nfld. In this connection it may be noted that more certified seed was sold in this province in 1953 than during any year since confederation in 1949 (G. C. Morgan).

SOFT ROT (?Erwinia carotovora). Several samples of soft rot were received from the Medicine Hat and Vauxhall areas, Alta., in early harvested crops. In one crop the tubers had decayed very rapidly when packaged in plastic bags (M. W. Cormack). The disease was rather prevalent in Canso in district 3, Ont. (H. W. Whiteside). Soft rot was common in blighted tubers received from the Maritime Provinces and Quebec this year. In N. B., when storage conditions were favourable,

soft rot was prevalent in tubers that were encased in muddy soil (J. E. Howatt).

POWDERY MILDEW (?Erysiphe cichoracearum) was sev. on the leaves of plants of Solanum demissum in the greenhouse at Fredericton, N. B., and interfered with use of the plants as differentials in virus studies (J. L. Howatt). Although the disease is rather widely reported on various species of Solanum in the United States, the present report appears to be the first for Canada (I. L. C.).

WILT (Fusarium oxysporum, Verticillium albo-atrum) was found in 12 or 1.6% of the fields inspected in B. C.; lack of warm weather probably accounts for its low incidence (H. S. MacLeod). Wilt, usually only a tr., was recorded in 24 (25%) of the fields inspected in s. Alta. (R. P. Stogryn). Not recorded in central and n. Alta. (J. W. Marritt). Tr. infections, the lowest in several years, were seen in 9% of the fields inspected in Sask. (A. Charlebois) and tr. -5% in 7% of the fields in Man. (D. J. Petty).

Some wilt was found in most fields inspected in the London district, Ont. In one field of Kennebec in Norfolk Co. 75% of the plants were affected; wilt was also rather heavy in Canso (F. J. Hudson). Isolations made from the Kennebec plants yielded 4 isolates of Fusarium sp. and one of Verticillium sp. (D. S. MacLachlan). Wilt was noticed in several fields and caused the rejection of 3 in district 2 (W. L. S. Kemp). Little wilt occurred in district 3 (H. W. Whiteside). Wilt was found in 10 fields in e. Ont. and caused the rejection of 3. On a farm near Richmond, wilt has been consistently troublesome and despite change of seed and varieties a crop is rarely produced that will meet certification standards (E. H. Peters). At the Substation, Fort William, it was noted by J. K. Knights that most of over 30 Fredericton seedlings on trial showed a wilt, whereas in other potato trials on the substation at some distance from these plots, no sign of the malady was seen. Isolations were made from the plants of F515, 5117 and 5120 which were received and a species of Fusarium was isolated (H. N. Racicot, D. S. MacLachlan). Wilt, less prevalent than last year, was observed only in a few fields inspected in N. B. (C. H. Godwin).

DRY ROT (Fusarium sp.) was observed in a few lots of Keswick this spring in Que., infection was 5-8%. A sl. infection was also present in a few lots of Green Mountain (B. Baribeau). A sl. amount was observed in a few bins in the winter and spring 1954 in N. B. (C. H. Godwin). Dry rot was quite common in tubers affected by late blight obtained from the Prairie Provinces and B. C. (J. L. Howatt). Dry rots affected about 1% of the tubers in storage in P. E. I. (H. L. McLaren).

RHIZOCTONIA (Pellicularia filamentosa (R. solani). Infection was 317-sl. 198-mod. 41-sev./736 fields inspected in B. C. It causes heavy losses each year by reducing the production of marketable tubers (H. S. MacLeod). In Oct. 1954, about half the tubers in a shipment of

Canso from a farm on Salt Spring Island were found unmarketable upon grading at Victoria. The chief defect was a dry brown decay and cracking of the tissue around the stem end (Plate 1, fig. 1, p. 100). Sometimes the decayed areas extended from the stem end for an inch with the periderm russetted and cracked and the lenticels occasionally discoloured. Strands of mycelium of Rhizoctonia solani were present on the surface of the tuber and in the cracked periderm and although sclerotia of the fungus were observed they were inconspicuous. In some tubers, the stem end was depressed on account of shrinkage of the decayed tissue. These tissues were dry chocolate brown and somewhat spongy; mycelial strands of the fungus were abundant in them. Mites, now present, were apparently hastening the breakdown of the tissue (W. Jones).

Rhizoctonia was present in nearly every field inspected in s. Alta., but there was little scurf development on the tubers on account of the wet fall (R. P. Stogryn). Rhizoctonia was found in most fields inspected in central and n. Alta. but infection was sl.-mod.; Sclerotia were few or none on tubers at bin inspection (J. W. Marritt). The disease infected 50% of the plants in one field in the Edmonton area; in the other 8 fields examined infection was tr.-sl. (W. P. C.). Rhizoctonia was present in most fields and plantings in Sask., infection was usually sl. (A. Charlebois, R. J. Ledingham). The cool moist conditions this year favoured the development of the basidial stage on the stem bases, for it was found in virtually every garden patch or farm field examined; on the other hand sclerotium development on the tubers was comparatively sl. (T. C. Vanterpool). Infection was sl. in most fields in Man., but mod. on the heavier soils about Winnipeg (D. J. Petty).

In Ont., sl. infections were noted in the London district, (F. J. Hudson). Development of sclerotia on the tubers was less than usual in district 2, especially in areas where rain was abundant throughout the season (W. L. S. Kemp). Rhizoctonia appeared to be more prevalent than in 1953 in district 3, especially in parts of Simcoe Co. (H. W. Whiteside). The disease was observed in 31/51 fields inspected in e. Ont.; it appeared to be more prevalent on account of the wet season (E. H. Peters). Infection was 101-sl. 3-mod./1155 fields inspected in Que. and was about as heavy as last year; infection on the tubers was common but usually sl. (B. Baribeau). Rhizoctonia appeared to be more prevalent and infection in the field slightly more sev. than usual in N. B.; sclerotium development on the tubers was rather heavy on some lots of Bliss Triumph and Pontiac but none were rejected (C. H. Godwin). The disease was not sév. in N. S. (R. C. Leyton). Only sl. amounts of rhizoctonia developed in P. E. I. this year (H. L. McLaren). Sl. infections were noted in 4 fields in Nfld. (G. C. Morgan).

PINK ROT (Phytophthora sp.) About 20% of the tubers showed symptoms of pink rot when a garden plot of Sebago in the Victoria area, B. C., was harvested in August. The fungus was isolated and its pathogenicity established. The species was not P. erythrosepica, which has been previously reported in B. C. (cf. P. D. S. 23:63 and 25:68). Although



antheridia and oogonia have not yet developed, the fungus resembles P. cryptogea (W. Jones).

LATE BLIGHT (*Phytophthora infestans*) was first observed in B. C. by N. Meyers on Lulu Island on 17 July. However, on account of prevailing dry weather very little further spread occurred at that time. Toward the end of August the disease became general in many of the potato growing areas and by mid-September was sev. in many fields. From 1 June to 10 July the rainfall had built up ideal conditions for its development. A press release was issued jointly with N. S. Wright on 7 July, warning growers that late blight could be expected if the damp weather continued and that they apply recommended fungicides. However, on 11 July, dry weather, albeit cool, set in and continued until 14 Aug. By 23 Aug. as a result of rain, conditions were again favourable for blight development. Another press release was issued.

Frequent intermittent showers during the growing season made it difficult for growers to keep a fungicide on the potato tops and consequently even some growers who had sprayed their crops regularly suffered considerable loss from late blight. The loss is estimated at 10-15% of crop, the highest loss since 1948 (I. C. MacSwan). As many seed crops became infected with late blight after the last inspection the observations up to that time only provide information on the early stages of the epidemic in B. C. Late blight appeared to be more prevalent on the lower mainland than elsewhere. Its lesser prevalence on Lulu and Sea Islands is attributed to the fact that spraying and dusting of the crop to control the disease is more general on these Islands than on the mainland. Losses in some crops were as high as 20% or over, but in general these losses occurred where the crops had not been sprayed or dusted. Crops that were well protected by fungicides up to the time of top-killing were practically free from tuber rot (H. S. MacLeod). Late blight was epidemic on Vancouver Island; one grower who had not sprayed lost 50% of his crop although the tops were killed with rotovator (W. Jones).

Although late blight was not observed in the seed crops during inspection in s. Alta., it may have occurred at the close of the season. However, early frosts destroyed the tops to prevent its development (R. P. Stogryn). Late blight occurred in every field examined in the Edmonton area on 13 Sept. Infection was 50-100%. Loss from reduction in yield and tuber rot was estimated to vary from 20 to 90%. A single field 20 mi. e. of Edmonton showed only 10% infection, which probably caused no loss (S. B. Hrushovetz). Late blight became prevalent about Edmonton by mid-August. The epidemic that developed proved to be one of the most destructive ever experienced in the area although the severity of the disease varied greatly in the plantings examined (A. W. Henry). In the immediate vicinity of Edmonton late blight was also prevalent and sev. on potato in 1950, but in 1954 on account of high soil moisture at harvest the loss of crop was considerably greater (G. B. Sanford). In central and n. Alta., late blight was present chiefly in the Edmonton

district. Tuber infection was particularly heavy in Warba. When frost injury followed by soft rot were added to late blight rot the combined loss was very high in some lots. (J. W. Marritt).

Late blight was much more widespread and sev. in Sask. in 1954 than in any previous year. Many fields were sev. affected from Saskatoon e. to the Man. border. Fields around Saskatoon were almost completely defoliated by 15 Sept. Killing frosts did not occur until the end of September (R. J. Ledingham). Late blight was reported as far west as Wilkie (T. C. V.) and probably caused heavy losses throughout n. e. Sask. (A. Charlebois). Frequently, bacterial soft rot followed the late blight rot (T. C. Vanterpool).

Late blight was first observed in Man. on 3 Aug. near Winnipeg and a few days later at Portage la Prairie. Later mod.-sev. infections occurred over much of s. Man. Considerable loss from tuber rot occurred in table stock in some areas, particularly about Winnipeg (J. E. Machacek, D. J. Petty).

In Ont., little late blight developed in the London district (F. J. Hudson). The disease was quite prevalent in district 2, but heaviest losses were in fields which were dusted rather than sprayed, or sprayed too infrequently or they were fields of Katahdin rather than of an early maturing or blight resistant variety (W. L. S. Kemp). The amount of late blight in the tubers was surprisingly small despite its general prevalence in the field in all parts of district 3. The probable explanation is that for a time weather conditions were unfavourable for blight before the crop was dug. In the Cochrane and Temiskaming areas a killing frost occurred and in the other areas the practice of vine killing is quite general (H. W. Whiteside). Late blight was first observed in e. Ont. on 17 Aug. in Renfrew Co., over a month later than in 1953. Infection was a tr.-mod. in 20/51 fields inspected. Tuber infection was heavier than in previous years. Canso tubers were found infected for the first time (E. H. Peters).

Late blight was first observed in Que. on 7 July at Mascouche, Terrebonne Co., and in the Montreal district on 13 July. It was found s. of Montreal and in Quebec district on 21 July. The month was cool and precipitation rather low along the St. Lawrence above Quebec City and about Lake St. John, whereas along the Lower St. Lawrence and the Gaspé Peninsula, the total precipitation was much above normal. August was cool and rainy days frequent throughout the province, heavy rains were recorded on 4 and 12 Aug. Late blight began to spread and by 14 Aug. was reported from all potato areas of the province. The weather continued favourable for its spread and by 20 Aug. the disease was epidemic in many areas except in the Lake St. John and Chicoutimi districts. Rain was frequent in September and in excess in many regions and monthly mean temperatures were also above normal. Late blight was reported finally in Abitibi and at Clark City near Seven Islands. The foliage of resistant varieties such as Keswick, Canso, and Kennebec

became infected, but the severity of infection varied greatly in different fields and regions. Frequent rains interfered with spraying and harvesting the crops. Losses from tuber rot varied from a tr. to 100%. Traces of tuber rot were quite common in the resistant varieties and in an occasional field the incidence was high (H. Genereux, B. Baribeau). Late blight was very sev. in the Montreal district. By 16 Aug. the tops were dying and many tubers were rotting. Many crops were a total loss. In our plots at St. Martin no late blight developed on Canso and Kennebec (E. Lavallee).

Late blight was first reported in N.B. on 16 July in York Co. The disease developed rapidly and by mid-August practically every field in the potato growing areas showed some infection. Some fields, particularly Irish Cobbler were already completely killed. As a result of continued heavy rain it was inevitable that tuber rot would develop at harvest. It was present in nearly every field, the amount varying from a tr. to sev. The muddy condition of the crop made grading difficult and in some lots rot has continued to develop. The 1954 crop season was one of the most adverse on record. (C.H. Godwin).

Late blight was first noted in N.S. on 7 July on a warehouse dump at Pereaux and on 13 July in a commercial field at Glenmount. The disease increased rapidly in unsprayed areas. By mid-August susceptible potato varieties in Yarmouth and Digby counties were dead. Resistant varieties gave good crops. Little rain during late August and September permitted growers to keep the disease well in check. Losses were light in commercial areas (K.A. Harrison). In areas where the spray program was carefully carried out rot from loss did not exceed 10% and averaged about 1%. Resistant varieties, on which no spray was used continue to be largely free of blight and tuber rot (R.C. Leyton).

In some sections of North America potato production was curtailed by lack of sufficient moisture. In the northeastern part of the continent, however, meteorological conditions combined to permit the development of a devastating epidemic of late blight, some sections probably suffering the severest attack in their history.

In P.E.I., the frequent rains and high humidities that prevailed from mid-July until 3 August provided ideal conditions for the development and spread of late blight. Trace infections were observed on 19 July and the epidemic built up rapidly. During this period frequent application of fungicides was of the utmost importance, and the growers who kept their plantings well protected brought them through the danger period in very good condition. Finer weather, with humidities below the critical point, moved in during the latter part of August and the situation was alleviated.

A study of the weather records in 1954 reveals that frequent wetting of the foliage rather than the total rainfall favoured development of the epidemic. Precipitation from July to September at Charlottetown was



8.85 in. compared to 11.87 in. in 1953, and 15.61 in. in 1951. Frequent rains and poor drying conditions (e.g. a 60-hour period when the humidity was constantly over 90%) kept the foliage moist for long periods, allowing the fungus to sporulate abundantly.

Losses from late blight tuber rot, however, were below average. Farmers who sprayed thoroughly through August and who later completed the program by applying a chemical vine killer, harvested big crops in which little rot occurred. Unsprayed fields were wiped out so rapidly that there was little time for tubers to become inoculated from spores washed off the foliage and into the soil. In general, the greatest losses occurred in fields where spraying had been done in a haphazard manner, a program that merely slowed down the advance of the disease and provided a long period for rains to wash spores into the soil. Considerable losses, however, were encountered in potatoes for the early market, the tubers being dug when the epidemic was at its worst and the soil covered with viable spores. A ten-day holding period was put into effect by the table stock inspectors in order to prevent serious losses in transit.

The advisory service, set up in 1947 to guide growers in their control programs, was particularly effective in 1954. Weekly bulletins were issued from the Science Service Laboratory at Charlottetown. These were released to the public through the newspapers and radio stations of Prince Edward Island and Nova Scotia. (L.C. Callbeck). However, it should be noted that damage to the foliage by late blight probably reduced the yield 15%, or 30bu. per acre (H.L. McLaren).

Late blight was first noted in Nfld. on 21 July in the St. John's area. In early August infection was sev. on Irish Cobbler at Conception Bay and by early September the disease was widespread in all varieties. Infection was sev. in well known susceptible varieties, but it was sl.-mod. on the foliage of Sebago, Keswick and Canso. Several farmers in Conception Bay lost about 75% of their crop of Irish Cobbler. Tuber infection in late varieties were sl.-mod. at harvest, but losses in storage were sl. (G.C. Morgan).

A survey of the races of Phytophthora infestans was undertaken this year at Fredericton, N.B. From potato vines and tubers and tomato fruits that were received, 260 mass isolations were made. These isolations were used to inoculate the differential hosts. The results are shown in Table 7.

These results are based mainly on a single determination on the differential hosts. Although no accurate determination of race 0 is possible when other races are present, the data suggest its probable absence from many collections. This survey revealed that race 4 of the fungus was the prevailing form. It was found in about 43% of the collections made in Canada. This race is commonly encountered throughout the world in all countries where late blight is prevalent.

Table 7. Distribution by provinces of physiologic races of Phytophthora infestans in Canada in 1954.

Physiologic Race	P r o v i n c e s						Total
	P. E. I.	N. S.	N. B.	Que.	Man.	B. C.	
0				1			1
1	1		1	1			3
2	4		7	4		1	16
3	9		18	8	1	2	38
4	38	1	78	46	2	6	171
1, 2	1		2	3			6
1, 3	6		32	10		3	51
1, 4	7	2	17	37			63
2, 4				6			6
3, 4			21	11		1	33
1, 3, 4			1				1
1, 2, 3, 4			1				1
Total	66	3	178	127	3	13	390

Specialized races of the fungus appear to be more numerous in regions near the sea. There was some evidence that a simple race of the fungus tended to prevail from w. Que. to Alta. However, this condition was modified to some extent by the extensive growing of blight resistant varieties, which seem to favour the appearance of specialized races. The most common race found on tomato fruits was also race 4. The races are designated according to the scheme proposed by Black *et al.* (Euphytica 2:173-178. 1953). On the basis of four genes for resistance, there are possible 16 physiologic races (J.L. Howatt, P.N. Grainger).

LEAK or PYTHIUM ROT (*P. ultimum*) was quite common in potatoes being graded at Victoria, B.C. It was most prevalent in badly skinned immature tubers (W. Jones). Leak was again reported in tr. amounts from Grand Forks and Pemberton. It was also fairly prevalent on Vancouver Island. In 54 lots given tuber inspection 12 were affected; in the affected lots 0.25-6.25%, av. 2.1%, of the tubers showed leak (H.S. MacLeod). The stand was poor in many fields and garden plots in the Edmonton district, Alta., because of decay of the seed pieces in the water-logged soil. Later in the season many immature tubers decayed in the wet soil (W.P.C.). Quite a sprinkling of leak occurred in a variety test at Mindemoya, Manitoulin Island, Ont. In plots or parts of plots that happened to be in low spots, nearly all the tubers were affected. Isolations were made from 4 tubers; 3 yielded *P. ultimum* and one *Phytophthora erythroseptica*, the cause of pink rot (H.N. Racicot, D. S. MacLachlan). About 0.5% of the tubers were affected in 2 lots of

Green Mountain in Que. (B. Baribeau).

**SILVER SCURF** (Spondylocladium atrovirens). Numerous tubers were sev. infected in a lot of Burbank in storage at Courtenay, B. C. in February (N. Siefert). The disease was not prevalent when bin inspections were made from October to December in district 3, Ont. (H. W. Whiteside). A very sl. infection was noted in 3 lots of Green Mountain out of some 600 bin inspections in Que. in the fall months (B. Baribeau). Four tubers received from a 1953 crop grown on muck soil at Ste Clothilde showed sl.-sev. symptoms of silver scurf (D. S. MacLachlan). A sl. infection was noted in a few crops grown in N. S. (R. C. Leyton). Silver scurf was sev. on a lot of Irish Cobbler that had been stored in damp potato sacks in Queens Co., P. E. I., when the tubers were examined on 7 May (R. R. Hurst).

**POWDERY SCAB** (Spongospora subterranea) was found in 2 crops of White Rose in the Cloverdale area in the Lower Fraser Valley, B. C. (H. S. MacLeod), and on a few tubers of Early Rose in storage at Cedar, Vancouver Island (N. Siefert, W. Jones). Powdery scab was reported in most potato lots grown along the Lower St. Lawrence, Que. It affected 1-20% of the tubers and in a few sev. cases 25-80%. Soil moisture was high throughout the growing season (B. Baribeau). Powdery scab affected about 10% of the tubers in a field at the Alma Station, N. B.; the disease appeared to have been checked somewhat by treatment of the soil with Phygon (J. L. Howatt). Powdery scab has been observed this year in N. S., but no estimate is yet available of its prevalence (R. C. Leyton). A tr. was noted on tubers of Green Mountain on one market lot at Charlottetown, P. E. I. (R. R. Hurst).

**COMMON SCAB** (Streptomyces scabies) was again prevalent in the Cariboo, in central B. C., and in the Okanagan Valley. In the Cariboo, a small percentage of tubers are affected in most crops. Some growers have had to give up growing potatoes on account of sev. scab. This year only the smooth skinned varieties, Warba, Irish Cobbler and Canus, were affected (H. S. MacLeod). In central and n. Alta., infection was sl. and confined to Warba (J. W. Marritt). Scab was not particularly troublesome in Man. this year (R. J. Petty). Very little scab was observed in the London district, Ont., in 1954; comparatively few tubers were sev. affected (F. J. Hudson). Scab was little trouble in Durham Co. where rain was plentiful throughout the season; in other counties in district 2, up to 25% of tubers had to be culled out on account of scab (W. L. S. Kemp). The incidence of scab was much less in district 3 than in 1953. Ontario generally shows high resistance to scab, but when the variety is affected the lesions are deep. Cherokee was tested in several places and showed high resistance to scab (H. W. Whiteside). Infection from scab appears to have been light in e. Ont. (E. H. Peters). Infection was 150-sl. 6-mod. 2-sev./574 bins inspected in Que. The disease was less prevalent than usual on account of high soil moisture during the growing season (B. Baribeau).



A sl. increase of scab was observed in this year's crop in N. B. despite the wet season. A plot of Cherokee grown at Woodstock showed promise as a scab resistant variety; it has not yet been licensed for sale in Canada (C. H. Godwin). Little scab has been observed in the bins inspected this fall in N. S. (R. C. Leyton). Common scab was mod. in P. E. I. (H. L. McLaren). Some scab was observed in the Conception Bay area, Nfld. (G. C. Morgan).

WART (Synchytrium endobioticum). Infection was sev. in Conception, Trinity and Bonavista Bays, Nfld., in 1954 and diseased specimens were received from Burin Peninsula, Notre Dame Bay and Grand Falls. The prevalence of the disease in the 47 fields examined in the Conception Bay area can best be shown by giving the severity of the infections present on a large percentage of the tubers. The fields showing such infections were: 15-sev. 22-mod. 7-light and 3 showing no visible wart infection. The losses in marketable tubers might be considered high, but as provincial grading regulations contain no reference to the disease, farmers can easily make the diseased tubers marketable by breaking off the wart nodules while they are grading their crop. Such potatoes do not break down in storage unless attacked by some secondary organism nor do fresh wart growths appear unless the potatoes are held for a long time in storage.

Infections were sev. in fields of Arran Victory, Arran Comrade, Irish Cobbler, Green Mountain and Warba whereas they were light on those of Canso, Katahdin and Keswick. Sebago (mauve blossom) continues to show very high resistance to wart. Fields planted with certified Sebago were practically free from wart although those planted with local seed showed a certain amount of infection (G. C. Morgan).

WILT (Verticillium albo-atrum) was reported in 44/276 fields inspected in N. S. Of these 6 fields, 5 of Kennebec variety and one of Sebago, were rejected. Growers who treated their seed obtained good control of wilt with one exception. In one field Kennebec was planted for the second year in the same field; in some spots 50% of the plants were affected yet in a few rows where no potatoes were planted last year infection was less than 5% (R. C. Leyton). Wilt was less prevalent than last year and the number of fields rejected fell from 55 in 1953 to 25 in 1954 (H. L. McLaren).

CALICO (virus) was reported in tr. amounts in 11 fields in the Grand Forks area, B. C. (H. S. MacLeod).

LEAF ROLL (virus). In general there was a sl. increase in the amount of leaf roll in potatoes across Canada. The increase is reflected in a sl. increase, as shown in Table 5, in the number of fields rejected on account of the disease (I. L. C.). In B. C., leaf roll was reported in 218 (29.9%) of the fields inspected. Both the amount of leaf roll and the size of the aphid population have risen in the last 3 years. The

increase of leaf roll was particularly marked in 1954. This increase is attributed to the early appearance of aphids in 1953 before roguing operations were completed and failure of the spraying program to control the aphids (H. S. MacLeod). In central and n. Alta. leaf roll was reported in 34 (26%) of the fields inspected. The growing of pet varieties for which no certified seed is available in back yards and vacant lots in centres such as Edmonton and Red Deer are a distinct menace to other gardens in the area and even of commercial fields on the perimeter. Such varieties are often 100% affected by leaf roll (J. W. Marritt). The program of bringing seed of early varieties from the Cochrane area to central Ont. each year has greatly reduced the incidence of the disease in the southern half of district 3, Ont. The absence of aphids in the Cochrane area appears to insure crops of great freedom from leaf roll (H. W. Whiteside). Leaf roll was reported in 264 (22.8%) of the fields inspected in Que. (B. Baribeau). Sl.-sev. infections were noted in garden plots in St. John's, Nfld.; sl. infections also occurred in the wart plots in Conception Bay (G. C. Morgan).

MOSAIC (virus) was also somewhat less prevalent across Canada than in 1953 except chiefly in B. C. The drop is reflected in a decreased number of fields rejected for mosaic, (cf. Table 5) (I. L. C.). Mosaic was found in 119 (16.2%) of the fields inspected in B. C., an increase over the 2 previous years. This increase is attributed to the same causes mentioned for leaf roll (q. v.) (H. S. MacLeod). The disease was found in 11 (8%) of the fields inspected in central and n. Alta.; it is not a problem in fields inspected for certification (J. W. Marritt). Mosaic was recorded in 17/51 fields inspected in e. Ont. (E. H. Peters) and in 469 (40.6%) of those inspected in Que. (B. Baribeau). As in past years, mosaic was most prevalent in Green Mountain grown in Madawaska Co. N. B. (C. H. Godwin). Mosaic was recorded in 145/276 fields inspected in N. S.; in recent years, very few fields are entirely free of the disease (R. C. Leyton). Mosaic was less prevalent in P. E. I. than in 1953. However, the reduction may be due to the reduced acreage of Green Mountain (H. R. McLaren, J. E. Campbell). Mosaic was sev. in several fields of Arran Victory, Arran Comrade, Green Mountain and Kerr's Pink in Conception Bay (G. C. Morgan).

SIMPLE MOSAIC (*Solanum virus 1*, S strain) was observed in fields of Canso, Katahdin, Keswick and Sebago in York and Sunbury counties, N. B.; infection was tr.-3% (D. J. MacLeod).

TOP NECROSIS (virus X or *Solanum virus 1*). The tops of one of the Fredericton potato seedlings from the Experimental Substation at Fort William, Ont., submitted for examination appeared to be affected by a top necrosis, suggestive of the reaction of seedlings hypersensitive to virus X. Such seedlings are usually field immune (H. N. Racicot).

RUGOSE MOSAIC (*Solanum viruses 1 and 2*) was observed in 5 table

stock fields of Green Mountain in York and Sunbury counties, N.B.; infection ranged from a tr. to 4% (D. J. MacLeod).

MILD MOSAIC (*Solanum* viruses 1 and 3) was common in commercial fields of Green Mountain, Bliss Triumph, Netted Gem and White Rose in York and Sunbury counties, N.B.; infection was 0.5-5% (D. J. MacLeod).

LATENT DISEASE (virus S) was found at Fredericton, N.B., on 10 August in growing potato plants of the variety Green Mountain by a seriological method, for which virus S antiserum obtained from Prof. van Slogteren of the Flower-Bulb Research Laboratory, Lisse, Holland, was used.

The virus was first reported by Maria P. de Bruyn Ouboter at the Int. Congress on Potato Virus Diseases, Wageningen-Lisse, August, 1951. (cf. R. A. M. 32:144-145. 1953). Dutch, German, English and American varieties tested in Holland were found to be infected with virus S. It is claimed that a disease is caused in some varieties by infection with the virus. This is the first report of its presence in Canada by tests conducted in this country (J. Munro).

NET NECROSIS (virus). Three Green Mountain tubers, obtained from a commercial field near Fredericton, N.B., in 1953 and that showed severe net necrosis, produced plants that exhibited symptoms of leaf roll and a slight rosetting and chlorosis of the top leaves. When scions from these plants were grafted on Bonny Best tomato, symptoms resembling those of the purple (bunch) top virus developed on the tomato. When scions from the infected tomatoes were grafted to Green Mountain potato plants, purple (bunch) top developed in the tops and net necrosis on the tubers. When the leaf roll virus was transmitted by the aphid *Myzus persicae* to Green Mountain plants only the symptoms of leaf roll appeared in the tops and no net necrosis was present in the tuber. These experiments indicate that the purple (bunch) top virus has a definite bearing on the development of net necrosis in the Green Mountain variety. Two Green Mountain tubers, also from a commercial field in 1953, that showed net necrosis for about 1/2 in. at the stem end produced plants that exhibited a mild leaf roll and a chlorosis of the terminal leaflets. When scions of these plants were grafted to Bonny Best tomatoes, the symptoms on these plants resembled those induced by potato witches' broom virus, strain 2 of N.S. Wright (D. J. MacLeod).

PURPLE or BUNCH TOP (virus). A tr. of purple top was observed in only one field, of Netted Gem, in s. Alta. (R. P. Stogryn). Haywire symptoms were recorded in 27 (20.8%) of the fields inspected. These fields were located in the n. and w. parts of Alta. (J. W. Marritt). In one experimental plot at Saskatoon, Sask., near other species of plants affected by yellows, 12% of the potato plants were affected by purple top (T. C. Vanterpool). Most fields inspected in Man. showed tr. -0.5% of the



plants affected by purple top (D. J. Petty). Two affected plants were noted in one field at Strathroy, Ont. (F. J. Hudson) and tr. amounts in 2 fields in Ontario Co. (W. L. S. Kemp). Little purple top was observed in district 3, but it appeared again to be more prevalent n. and w. of North Bay (H. W. Whiteside). The disease was recorded in one 1/2-acre field in e. Ont. (E. H. Peters). Purple top was present in Que. in 2 fields of Canso, one of Keswick, and one commercial field of President (B. Baribeau). Bunch top was scarcely observed in fields of certified seed in N.B. this year. The disease was even less prevalent than in 1953 (C. H. Godwin).

Bunch top was found in commercial fields of Canso, Chippewa, Keswick, Kennebec, Katahdin, Pontiac, Green Mountain, Irish Cobbler and Bliss Triumph in York and Sunbury counties, N.B.; infection was tr. -2.5%. The late leafroll stage was found affecting 2-37% of the plants in fields of Canso, Keswick, Katahdin, Kennebec, Irish Cobbler and Bliss Triumph. Haywire was noticed affecting 3 plants in a field of Green Mountain (D. J. MacLeod). A tr. or slightly more of purple top was reported in 3 fields in N.S. (R. C. Leyton). Very little purple top was reported this year in P. E. I.; however, a few fields were affected. In one 3-acre field of Sebago 30% of the plants showed symptoms (J. E. Campbell). About 5% of the plants were affected in two fields of Sebago and Katahdin at Topsail, Nfld. (G. C. Morgan).

SPINDLE TUBER (virus) was of no importance in Man. (D. J. Petty). The disease was present in several fields, especially in the n. part of district 3, Ont.; in one lot of Keswick in the Cochrane area 1% of the plants were affected (H. W. Whiteside). A sl. infection was observed in a few fields of Kennebec in Que. (B. Baribeau). Small amounts of spindle tuber were recorded in a few fields in N.B. (C. H. Godwin). Spindle tuber was found in 7 commercial fields of the varieties Canso, Kennebec, Irish Cobbler, Green Mountain and Bliss Triumph in York and Sunbury counties. Infection was tr. -3%. The disease appears to be increasing in commercial fields in the province (D. J. MacLeod). Spindle tuber was observed in fields of Irish Cobbler, Sebago and Kennebec in N.S.; the highest infection recorded was 1% in a field of Sebago (R. C. Leyton). Spindle tuber was less prevalent than in 1953; 19 fields were rejected compared to 83 the previous year (H. L. McLaren).

STEM-END BROWNING (virus) was observed in tubers of Green Mountain, Keswick, Kennebec, Netted Gem, and Russet Rural; infection was tr. -4%. The bunch top virus was found in 52% of the Green Mountain (37 tubers) and 32% of the Keswick (19 tubers) sources examined. This type of stem-end browning appeared only in tubers kept at 44-55°F. but not in tubers stored at 33-36°F. Both the xylem and phloem tissues are affected (D. J. MacLeod).

STREAK and ROLL (virus). A disease, which I have designated Streak and Roll appeared in severe form in the varieties Cherokee, Sebago, Irish Cobbler, Golden, Katahdin and Chippewa in experimental plots on a farm

near Fredericton, N.B. Bliss Triumph and Green Mountain grown on the same farm showed no evidence of the disease. A trace, however, was found in a field of Irish Cobbler near Keswick. The virus causing the disease was transferred by stem grafting and sap inoculation from Cherokee to U.S.D.A. Seedling 41956, and Irish Cobbler in which it produced the characteristic rolling of the leaves and a necrosis of the petioles and stems. It was also transmitted by grafting and sap inoculation to Datura tatula, in which it produced a ruffling and chlorosis of the leaves and a necrosis of the petioles and stems. In all plants affected a severe leaf-drop streak finally developed and the top of the plant was destroyed. The virus failed to produce symptoms in Nicotiana tabacum, Capsicum annuum and Lycopersicon esculentum when it was introduced by stem grafting (D. J. MacLeod).

WITCHES' BROOM (virus) was found in 40 (5.5%) of the fields inspected and caused one to be rejected in B.C. The disease is much less serious in the Cariboo, than it was from 1948-51 (H. S. MacLeod). Witches' broom, a rare find in s. Alta., was observed in 3 fields (R. P. Stogryn). Witches' broom was found in 7 (5%) of the fields inspected in n.w. parts of Alta. (J. W. Marritt). The disease was again observed in several varieties in the North Bay and Cochrane areas of Ont. (H. W. Whiteside). A single affected plant of Irish Cobbler was seen in a garden at Charlottetown, P. E. I. (R. R. Hurst).

YELLOW DWARF (virus). A few plants of Keswick were again found affected with yellow dwarf about Cochrane and in Simcoe Co., Ont. (H. W. Whiteside).

BLACK HEART (non-parasitic) was sev. in one lot of certified Netted Gem seed grown at Duncan, B. C.; storage conditions were poor (W. Jones). Affected tubers were received from Janson, Sask.; the soil was very wet late in the season (T. C. Vanterpool). A few affected tubers were noticed in a bin of Irish Cobbler in Drummond Co., Que. (B. Baribeau). Typical black heart symptoms were seen in Sebago tubers from the bottom of a deep pile in storage at Bedeque, P. E. I. (J. E. Campbell).

ENLARGED LENTICELS were found on a few tubers of Warba, Green Mountain, Kennebec and Canso varieties at bin inspection in Que. (B. Baribeau).

FROST DAMAGE. No frost injury was reported in the early part of the season in central and n. Alta., as on account of excessive moisture in the soil, most fields were not planted until late May or early June, when danger from frost was past. However, heavy frosts in September caused 10-20% loss in the field. In addition considerable breakdown of tubers touched by frost took place after the crop was placed in storage. In the Edmonton area, the loss was still greater on account of late blight causing much tuber rot. (J. W. Marritt). One killing frost throughout

district 2, in Ont., and two killing frosts in some areas occurred before or at digging time. The resulting injury coupled with the damage caused to the tubers by late blight caused a 25% reduction of the certified seed crop (W. L. S. Kemp). In the Kemptville-Prescott area, frost injured 0.5-10% of the crop (E. H. Peters). Frost injury was reported in 145 (25.2%) of the bins inspected in Que.; injury varied from 0.5 to 5%, with some lots showing 25%. In general, wet weather delayed the harvest, and heavy frosts in late October were destructive (B. Baribeau). A sev. field frost on 8 Oct. in N. B., when a third of crop was still unharvested, resulted in mod. -sev. frost injury in late harvested potatoes. In a few bins break-down caused complete loss of the crop (C. H. Godwin). Early frost caused sl. damage in many potato fields in P. E. I. (J. E. Campbell). Frost injured many fields in Conception Bay, Nfld.; the tubers showed typical frost necrosis and breakdown at harvest (G. C. Morgan).

Frost killed the heavy vine growth a few days before digging in a field of Columbia Russet at Estevan, Sask., in 1953. When the tubers were examined in April 1954, 25-30% of the larger tubers were affected by frost necrosis, with also some low temperature breakdown; smaller tubers were less affected (H. N. Racicot).

**GIANT HILL.** A tr. was found in 7 fields inspected in s. Alta. (R. P. Stogryn). A few plants of several varieties were affected in district 3, Ont. (H. W. Whiteside). The disorder was reported in a few fields in the Chicoutimi and Lake St. John districts, Que. (B. Baribeau). Plants suspected of being affected with giant hill were found in fields of Green Mountain and Irish Cobbler planted in tuber units. Although these plants are very coarse and tall, they produce quite normal appearing tubers. In 1953, selections made from normally appearing plants in tuber-unit fields, indexed in the greenhouse and planted this year, gave plots containing no off-type plants (R. C. Leyton).

**HOLLOW HEART** affected about 1% of the Canso tubers grown at Fournier, Ont. (E. H. Peters). The disorder was found affecting not over 1% of the tubers in a few lots of Canso and Kennebec at bin inspection in Que. (B. Baribeau). Hollow heart affected about 1% of tubers of Irish Cobbler and a few tubers of Sebago grown in the Charlottetown area, P. E. I. (R. R. Hurst). The disorder was particularly troublesome in Sebago grown in low fields in Clarkes Beach, P. E. I. (G. C. Morgan).

**INTERNAL BROWN SPOT** affected an occasional tuber of Canso in a bin at Charlottetown, P. E. I. (R. R. Hurst).

**MAGNESIUM DEFICIENCY** was rather sev. in a field of Irish Cobbler at Union Road, P. E. I. (R. R. Hurst).

**NET NECROSIS.** Phloem necrosis (virus) has been observed in B. C. in tubers of many crops, especially in the Grand Forks area. In part, at least, its occurrence is connected with infection with leaf roll. Net necrosis, as



a result of heat, drought or frost was noted in only a few crops in small amounts (H. S. MacLeod). A tr. was reported in a bin or two of Green Mountain in Madawaska Co., N. B.; it is much less prevalent than formerly (C. H. Godwin). Net necrosis (0.5%) has been reported in one lot of Netted Gem in N. S. (R. C. Leyton).

NO-SPROUT TUBERS. Misses again appeared to be more prevalent than usual in all fields and varieties in district 3, Ont. The condition is attributed to faulty storage (H. W. Whiteside). Several poor stands occurred in Que., particularly of Canso in the Kamouraska district. The buds failed to produce a sprout; instead, small tubers were formed about the eye on short stolons. In one field 16% of the sets failed to produce tops (B. Baribeau).

STEM-END BROWNING. Some stem-end browning was observed in both Keswick and Canso crops grown in district 3, Ont.; mostly larger tubers are affected (H. W. Whiteside). It was found affecting 14% of the tubers in a lot of Canso and 1% in a lot of Green Mountain at bin inspection (B. Baribeau). In a lot affected by net necrosis in N. S., 4% of the tubers showed stem-end browning (R. C. Leyton). As a result of 30% of the tubers showing mod. stem-end browning, 3 carloads of Irish Cobbler grown at Union Road, P. E. I., were turned down for seed (J. E. Campbell).

STEM STREAK (manganese toxicity). A sl. amount of stem streak was seen in an early planting of Irish Cobbler at Charlottetown, P. E. I. The soil was very acid (pH 4.7) (J. E. Campbell).

WIND DAMAGE caused by hurricane "Edna" on 11 Sept. was heavy in potato fields in P. E. I. Often the tops were twisted off (R. R. Hurst).

### PUMPKIN

POWDERY MILDEW (Erysiphe graminis) was observed on foliage of most plantings in late August and September in s. w. Ont. (C. D. McKeen).

### RADISH

SOFT ROT (Erwinia carotovora) affected by 26 Aug. about 25% of the seed crop plants of Comet in an acre plot at the Central Experimental Farm, Ottawa, Ont. (V. R. Wallen).

SCAB (Streptomyces scabies) had so sev. infected a shipment received on the market, Toronto, Ont., that the radishes were unmarketable (J. K. Richardson).

### RHUBARB

CROWN ROT (cause unknown) was reported on Strawberry rhubarb from Deep River, Ont., as follows: "First, the outer leaves develop brown

dead areas at the edges; then the outer stalks go limp; then leaves go brown and shrivel up - leaving only the small central shoots to die last. The roots, on examination, have gone black and appear to have rotted" (H. N. Racicot). Only one specimen of crown rot was received this summer in Sask.; it came from Golden Prairie. The cool summer probably slowed its development (T. C. Vanterpool).

RED LEAF (cause unknown) is present in nearly all plantings of rhubarb observed in the Lethbridge area, Alta. In all 35 reports of diseased rhubarb were received from householders in an area extending from Taber to the foothills and from Claresholm to the international border. Several of these reports were checked and the symptoms resembled the general condition described as Red Leaf. There are indications that the disease is at least in part attributable to a virus (J. T. Slykhuis). The disease was noted in several plantings around Edmonton and Lacombe (W. P. Campbell). Red leaf was sev. in the variety plots at the Station, Melfort, Sask.; all varieties were affected, some more sev. than others. The disease was noted at Saskatoon both in city and farm gardens (R. J. Ledingham).

#### SALSIFY

WHITE RUST (Cystopus cubicus) was heavy at the Botanical Garden, Montreal, Que. (P. Duval). A sl.-mod. infection was also noted at Ste Foy (D. Leblond).

#### SQUASH

GREY MOULD (Botrytis cinerea) affected about 5% of the squash in storage at Hortonville, N.S. Rhizopus also affected about 1%. Apparently rot developed as a result of rough handling or injuries at harvest (K. A. Harrison). Botrytis cinerea caused some fruit rotting of pumpkin and squash in a field at Ste Foy, Que. Other organisms observed on the decaying fruit were Fusarium, Alternaria and Phoma (D. Leblond).

POWDERY MILDEW (Erysiphe cichoracearum) affected most crops in s. Essex Co., Ont., in August and September (C. D. McKeen). The disease was found in a half-acre patch in Lincoln Co.; there were several evident centres of infection in the field (J. K. Richardson).

STORAGE ROT (Mycosphaerella citrulina). The fungus was isolated from 2 Acorn squash from a small garden patch at Kentville, N.S. The disease was not found in some 50 tons of Buttercup and Hubbard squash being held in storage at Grand Pré (K. A. Harrison).

MOSAIC (virus) caused a mottling of the leaves and concentric brown rings on the fruit in some fields in Essex Co., Ont. (C. D. McKeen).

YELLOW (Callistephus virus 1) was found sev. affecting 3 plants in a

station plot, Fredericton, N.B. (D. J. MacLeod).

### SWEET CORN

RUST (Puccinia sorghi) caused a tr. infection in the plots at St. Jean, Que. (R. Crete).

SMUT (Ustilago maydis) infection was a tr. in a planting at Medicine Hat, Alta. (F.R. Harper); in the Botanical Garden, Montreal, Que. (P. Duval); and in gardens in Kings Co., N.S. (K.A. Harrison).

### TOBACCO

A special report on tobacco diseases in Ontario and Quebec was prepared by Dr. Z. A. Patrick and Dr. L. W. Koch.

#### Seedbed Diseases

BLUE MOULD or DOWNY MILDEW (Peronospora tabacina). As usual mould outbreaks occurred late in the season both in the Old and New Tobacco Belts of Ontario. The outbreak occurred around 27-30 May in a number of greenhouses around Simcoe and groundbeds around Cedar Springs. It did not cause much damage in the New Tobacco Belt because much of the transplanting was completed and also the outbreaks were confined to a few greenhouses. In the Old Tobacco Belt, especially around Cedar Springs, the damage was more extensive. On account of the cold wet spring the plants were small in this area and only about 50% of the fields were planted when blue mould appeared. As a result there was a shortage of burley plants for transplanting. To date this disease has not appeared in Quebec.

YELLOW PATCH (excessive nutrients) was very common seedbed trouble this year. Many growers still tend to over fertilize their tobacco seedbeds. If such beds are also watered unevenly the plants in areas of the seedbed remain stunted and patchy through lack of proper nutrient balance in the soil. Above-ground symptoms consist of chlorosis and stunting of affected seedlings in patches of irregular shape. Roots are stunted and to various degrees discoloured. Recovery often occurs if the plant bed is allowed to dry out and then watered very heavily to leach out some of the fertilizer.

COLD INJURY was very common this year in ground seedbeds of burley tobacco. Two types of cold-injury were noted. The usual type was present where the plants show a yellow to white growing point and narrow leaves and the new leaves as they develop are white and cup-shaped. In some beds, soft rot bacteria entered the leaves and caused further injury. With warmer weather the affected plants recover and grow normally except that the affected leaves do not recover completely and appear mottled, somewhat like those on plants affected by mild mosaic.



DAMPING OFF (Pythium spp. and Rhizoctonia solani) was widespread and caused mod. to heavy damage during the early part of the season when the weather was cold, cloudy and wet. Most sev. damage was caused where plants in the seedbed were too crowded and where water was applied in excess. It was noted that in beds where damage was heavy the grower had not followed the recommended program for control of blue mould. This program consists of a spray application of ferbam 4 lb. in 100 gal. of water, using 4-5 gal. per 100 sq. yd. of seedbed. The dust can also be used. First application is made when the leaves on the young seedlings are the size of a dime and the applications are repeated twice a week until transplanting time.

ANGULAR LEAF SPOT and WILD FIRE (Pseudomonas tabaci and P. angulata). Symptoms of both angular leaf spot and wild fire were found in two ground beds of burley tobacco near Woodslee, Ont., on 14 May. Wild-fire symptoms observed were scorched leaf tips surrounded by broad yellow halos, the whole leaf often turning yellow. Small plants were wilted or dead. Individual lesions on the leaves consist of white dead centres surrounded by yellow halos. However, other lesions consisted of more irregular water-soaked areas, which turned brown or black. Although wild fire and angular leaf spot have been considered to be caused by two distinct species, P. tabaci and P. angulata, some workers now consider the pathogens are variants of a single species. After a period in storage cultures of the wild-fire organism often produce symptoms of both wild fire and angular leaf spot even when the cultures were started from a single cell. In tests at the Harrow laboratory with some of the isolates both yellow halos and irregular water-soaked lesions were produced on burley tobacco leaves.

The disease first appeared in the plant beds during cold wet weather and a survey of plant beds showed that the disease was present only on burley tobacco planted in ground beds where ditch water was used for watering. No wildfire or angular leaf-spot was present where well water was used. The disease was successfully controlled when a fixed copper was used as a spray or dust. The plants were sprayed twice a week with fixed copper, 8-10 lb. per 100 gal. of water, and 10-12 gal. were applied per 100 sq. yd. of seedbed. No carry over of the disease from seedbed to the field was noted.

MUSHROOMS caused mild damage throughout the burley and dark tobacco areas of Kent County where outside seedbeds are used.

GREEN SCUM (algae). About the time that plants are coming up, some beds develop a green or reddish green growth over the entire soil surface. This condition causes a stunting and suffocation of the plants because of improper soil aeration. It can be overcome by breaking the crust at regular intervals and the application of bordeaux or fixed copper as described for wild fire.

**CHEMICAL INJURY.** A number of cases of 2,4-D injury were noted. Injury from this herbicide is becoming less common because the growers realize the danger of using improperly cleaned sprayers or of drift from adjacent weed-spraying operations.

A few cases of creosote toxicity were noted in new greenhouses where this wood preservative had been used.

### Field Diseases

**BLUE MOULD** (*Perenospora tabacina*). No cases of blue mould in the field were observed in the tobacco growing areas of Ont. and Que. this year.

**BROWN ROOT ROT** (nematodes) is becoming one of the most serious diseases of burley and flue varieties throughout Ont. The disease was most severe in light sandy soils where it causes much stunting and reduction of yields. The disease was widespread occurring throughout both tobacco belts. In most of the fields visited some brown root rot damage was noted. <sup>1/</sup>

**BLACK ROOT ROT** (*Thielaviopsis basicola*). Very little root damage was attributed to black root rot. Its low incidence is probably due to the widespread planting of several resistant burley varieties and of the resistant flue-cured variety Delcrest.

**FRENCHING** (?soil toxins). A few fields of tobacco were sl.-mod. damaged by frenching. The disorder was limited to fields where the soil type is marginal or unfavourable for growing tobacco and on poorly drained soils.

**SOFT ROT** (*Pythium* spp.) occurs soon after setting. The recently set plants wilt and, when removed from the ground, they will be found to be affected by a soft watery rot of the buried stem. The disease occurred in scattered areas throughout the fields usually in low spots with poor drainage.

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<sup>1/</sup> In a recent study, W.B. Mountain (Can. J. Bot. 32:737-759. 1954) has shown that root-lesion nematodes, *Pratylenchus* spp., are the primary causal agents of brown root rot of tobacco in Ontario. In this province, "brown root rot is caused by *Pratylenchus minyus*, *Pratylenchus* sp. and probably to some extent by *Pratylenchus penetrans*" These species are distinct from those encountered in the southern United States (I. L. C.).

**SORE SHIN** (*Rhizoctonia solani*). On account of the wet spring, sore shin, along with the Pythium soft rot, caused mod. losses in the new transplants. Decay starts at or near the surface of the ground usually at a bruised spot on the stem. Affected plants show brown or black discoloured areas occurring on one side or entirely around the stem near the ground. In mild cases only superficial tissues are involved and the plants recover if favourable growing conditions exist. In sev. cases during wet cold weather both cortical and vascular tissues are invaded and the plant dies.

**LEAF-SCALD** (cause undetermined) is characterized by the tip ends of the leaves becoming wilted and failing to recover. The wilting occurs in hot weather following periods of rapid growth. The damaged leaves turn brown and die. This disorder is often attributed to the sting of one of the stink bugs.

**NONPARASITIC LEAF SPOT** (cause undetermined) was more prevalent than for some years past. It is characterized by small brown spots on the leaves which later become dead and often turn greyish-white. No parasitic fungus or bacterium can be found in the spots. The degree of spotting varies from a few widely separated spots on the leaf to a condition where the entire leaf is covered with spots.

**MOSAIC** (virus). Injury from tobacco mosaic was widespread throughout the burley, dark and flue-cured tobacco growing areas of Ont. and Que. Most of the fields visited had a few diseased plants. Damage was heavy only in those fields where the growers failed to take proper sanitary precautions in their transplanting operations.

**ETCH** (virus) caused some damage to burley and black tobacco in the Old Tobacco Belt of Ont. It was not observed on flue-cured tobacco.

**RING SPOT** (virus). A few ring-spot infected plants were found in most of the tobacco fields visited. It occurred on burley, black and flue-cured varieties. Though ring spot was found in nearly every tobacco field it is rarely destructive to individual plants and usually very few plants in the field are infected.

**OTHER VIRUS DISEASES.** Several other viruses affect tobacco in the field. They only affect very few plants and are usually not very injurious. These include the streak virus, vein-banding virus and several of the cucumber mosaic viruses. These viruses although still unimportant may become more prevalent because most of them together with the etch viruses are aphid-transmitted and the peach aphid has now become established in most of the tobacco-growing areas of Ont.

**HOLLOW STALK** (*Erwinia carotovora* and *E. atroseptica*). A few cases of stalk soft rot and hollow stalk were observed. They were due to topping damage and the use of suckering oils.



### Other Observations

**MOSAIC (virus).** Infections were heavier than usual in flue-cured tobacco fields in Que., as much of the cultivating had to be done under wet conditions. Where tobacco followed tobacco, often nearly 75% of the plants were infected (F. Godbout). A few plants in a plot at Kentville, N.S., showed sev. symptoms of mosaic (K.A. Harrison).

### TOMATO

**EARLY BLIGHT (*Alternaria solani*)** infections were noted on Early Chatham at Medicine Hat and on Farthest North at Brooks, Alta. (F.R.H., J.S.H.). A tr. infection was found on the foliage of most early marketing and canning crops in Essex Co., Ont. (C.D. McKeen). Infection was general and quite sev. in many plantings in Lincoln Co. but growers were little concerned (J.K. Richardson). On Isle Jesus, near Montreal, Que., early blight caused the foliage to dry up and about 20% of the fruits became affected through the many growth cracks present (E. Lavallee). A mod. infection occurred on staked Chatham plants at Normandin (L.J. Coulombe). It was heavy on greenhouse plants at Mastai in early September (D. Leblond). Early blight was very general in the principal tomato growing areas in N.B. (S.R. Colpitts). Early blight was present at Kentville, N.S., but caused little damage (K.A. Harrison). A sl. infection was noted on Harkness in Queens Co., P.E.I. (J.E. Campbell). A sl. infection was present on the foliage at St. John's, Nfld. (G.C. Morgan).

**NAIL-HEAD SPOT (*Alternaria tomato*).** Infection was sl.-sev. on tomato fruits imported from Mexico when they were examined in Quebec City in January (D. Leblond).

**GREY MOULD (*Botrytis cinerea*)** was reported from the city greenhouses, Edmonton, Alta. (W.P.C.). Grey mould affected about 35% of the fruit in a planting at Ste Foy, Quebec Co., Que. (D. Leblond). Grey mould caused about 5% damage in a planting of Early Chatham at Berwick, N.S. The disease increases with increased fertility and on plants grown under sprinkler irrigation so that it is a problem in intensive tomato production. About 1% of the stand of Improved Bay State was affected in greenhouses in King, Hants and Annapolis counties, N.S. Dull weather made humidity control in greenhouses very difficult this season (K.A. Harrison).

**LEAF MOULD (*Cladosporium fulvum*)** was sev. on Vetomold in a greenhouse on Lulu Island, B.C. Loss was probably sl. as in an effort to retard mould development the grower kept the soil dry. As a result ripening of the crop was hastened, an asset at that time (I.C. MacSwan). Leaf mould caused sl. damage in 2 greenhouses at Medicine Hat, Alta. (M.W. Cormack). Leaf mould caused a loss of 20% of the crop in a

spring greenhouse crop in Annapolis Co., N.S. In one lot of Improved Bay State seed about 10% of the plants were susceptible. The plants were used for the fall crop in 6 greenhouses. About 50% loss in yield was suffered by the susceptible plants (K. S. Harrison).

**ROOT ROT** (Colletotrichum atramentarium) Blair H. MacNeil (Plant Dis. Reptr. 39:45-46, 1955) reports the sporadic occurrence of a root rot of greenhouse tomatoes in s. Ont. in recent years. He gives an excellent description of the disease, the isolation of the pathogen and how it may be controlled (I. L. C.).

**ANTHRACNOSE** (Colletotrichum phomoides) caused a sl. infection on a few canning crops in Essex Co., Ont. Spraying with ziram or maneb has been effective in reducing the damage caused by the disease. Zineb has not been tested (C. D. McKeen). A sl.-mod. infection was observed on green fruits at Burlington on 10 July. Lesions on the blossom-end of the fruit could be confused with blossom-end rot as the fungus was not yet sporulating. Lesions on other parts of the fruit formed the more typical circular sunken areas. (see Plate 1, fig. 2, p. 100). The pathogen was readily isolated. Spraying with maneb appeared to check disease spread (J. K. Richardson). A single affected fruit received from St. Pierre les Becquets, Que. (D. Leblond). Infection was sev. on fruit from a garden at Kentville, N.S., where the disease has been present before. A sl. infection occurred on fruits from spray plots on ground on which tomatoes have not been grown for several years (K. A. Harrison).

**BACTERIAL CANKER** (Corynebacterium michagense). Sl. mod. infections were noted in home gardens at Ste Anne de Beaupre, Baie St. Paul, and St. Alexis de Port Alfred, Que. (L. J. Coulombe).

**WILT** (Fusarium lycopersici) was observed in tomatoes grown on infested soil in Essex Co., Ont. (C. D. McKeen).

**ROOT KNOT** (Meloidogyne sp.) caused a variable amount of damage to roots of plants in Essex Co., Ont., where the greenhouse soil had not been sterilized. (C. D. McK.).

**PHOMA ROT** (P. destructiva) was prevalent on tomato fruits in the area about Quebec City in September. In one crop at Ste Foy, 50% of the fruit were affected (D. Leblond). Very little Phoma rot was seen or reported in N.S. this year (K. A. Harrison).

**LATE BLIGHT** (Phytophthora infestans) was general in most gardens on Vancouver Island, B. C. and caused much damage; it was more prevalent than in any previous year except perhaps 1948 (W. Jones). It was general throughout home and commercial plantings on the lower mainland; loss moderate (I. C. MacSwan). From specimens received,

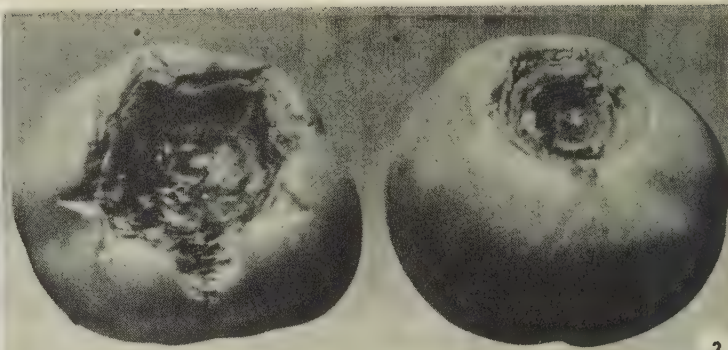
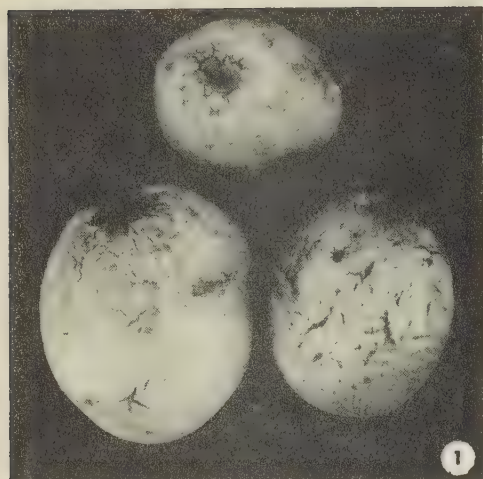


Fig. 1 Stem-end browning and cracking in tubers of Canso potatoes caused by *Rhizoctonia solani*. Salt Spring Island, B.C. October 1954.

Fig. 2 Anthracnose lesions on green tomato fruits caused by *Colletotrichum phomoides*. Burlington, Ont. July, 1954.

Fig. 3 Rot of Kiefer pears caused by *Phytophthora cactorum*. St. Catharines, Ont. October 1954.

Fig. 4 Blackened root tips and rat-tail appearance of roots of strawberry plants affected by red stele (*Phytophthora fragariae*). Lincoln Co., Ont. 31 May 1954.



it was evident that tomatoes were sev. affected and losses heavy in fall-harvested fruit in e. Sask. (R. J. Ledingham, T. C. Vanterpool). Late blight was fairly general on tomatoes in Man.; in some fields 25-50% of fruit were affected (J. E. Machacek, W. A. F. Hagborg). As usual, late blight was noted in the Montreal area, Que., much later on tomatoes than on potatoes. In the laboratory plots at St. Martin it was found on potatoes on 13 July and on tomatoes on 13 August. On Isle Jesus, about 30% of the crop was lost, and losses were probably higher elsewhere where the crop is not so early (E. Lavallee). In many gardens about Quebec City the crop was a total loss (D. Leblond). A sl. infection was already present at Baie St. Paul on 27 Aug. (L. J. Coulombe). The disease was observed in most regions of Que. and losses amounted to 5-100% of the crop (H. Genereux). Late blight was sev. on tomatoes throughout the vegetable area of N. B.; loss was 60% of the crop (S. R. Colpitts). Although late blight was found on potatoes in early July it was mid-August before it was observed on tomatoes. Dull weather favoured its gradual spread and in unsprayed plots 30% of the fruits were destroyed. As a result of low rainfall in late August and September, growers were able to secure excellent control by spraying (K. A. Harrison). Late blight was first noticed on the foliage on 17 Aug. and on the fruit on 30 Aug. in Queens Co., P. E. I. (J. E. Campbell). A sl. infection was observed on the foliage of Vulcan and Vetomold in a greenhouse in St. John's, Nfld. (G. C. Morgan).

BUCKEYE ROT (Phytophthora parasitica) mod. affected Bonnie Best in a garden at Victoria, B. C.; previously found only in greenhouse crops (W. Jones).

DAMPING-OFF (Pythium sp.) caused the death of 40% of the 18,000 seedlings being grown by one grower at Gagetown, N. B. (S. R. Colpitts). The damping-off was attributed to Fusarium, but Pythium is usually the primary pathogen (I. L. C.).

STEM ROT (Sclerotinia sclerotiorum) affected several plants of one variety in a variety trial at Chilliwack, B. C. (I. C. MacSwan). Tr. observed in the spray plots at Kentville, N. S., this fall (K. A. Harrison).

LEAF SPOT (Septoria lycopersici), as usual, caused varying amount of damage in several early and canning crops in Essex Co., Ont. Irrigation of early crops increased its incidence (C. D. McKeen). A sl. infection was seen at Charney, Que. (H. Genereux) and in the plots at Kentville, N. S. (K. A. Harrison).

WILT (Verticillium spp.) affected some 150 Vetomold plants in patches in a greenhouse on Lulu Island, B. C.; the loss was sl. (I. C. MacSwan). Nearly 50% of the plants were sev. affected in the plots at Lethbridge, Alta. Damage was sl.-mod. in the plots at Brooks and sl. in a greenhouse at Medicine Hat (F. R. Harper).

MOSAIC (tobacco mosaic virus) affected specimens of greenhouse tomatoes were received from Carmacks, Yukon. The presence of tobacco mosaic virus at least was established by inoculating tobacco. (H.N. Racicot, D.S. MacLachlan). Mosaic (tobacco and cucumber mosaic viruses) affected a high percentage of the plants in most greenhouse crops in Essex Co., Ont. The amount of mosaic on field crops varied from field to field (C.D. McKeen).

GREY WALL (virus). Symptoms of grey wall were pronounced on fruits in one canning crop near Dresden, Ont.; infected fruits were most prevalent during mid-harvest. A strain of tobacco mosaic virus was definitely identified from these home-grown plants (C.D. McKeen).

Mosaic affected 50% of the plants in 3 home gardens at Sorel, Que., and about 25% in an acre field examined at St. Martin (F. Godbout, E. Lavallee). The greenhouse crop was 100% infected by mosaic in the spring 1954 in N.S. The fall crop was not so severely affected. In one house, where the plants were sprayed with 10% solution of milk in water, the spread of mosaic appeared to be held in check <sup>3/</sup>. The field crop was comparatively free of mosaic, average infection being about 10% (K.A. Harrison). Mosaic affected about 25% of the plants and injured 5% of the fruit in a greenhouse in St. John's, Nfld. Tobacco mosaic virus was found to be present on inoculation of Nicotiana glutinosa (G.C. Morgan, H.N. Racicot).

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<sup>3/</sup> The milk spray was developed by J. Newell, John Innes Horticultural Institution (The Grower 41:1409. June 26, 1954), as a result of a discussion with J.C. Bawden. In his article "Milk spray cured tomato mosaic," he points out that "Mosaic is probably the most widespread disease of glasshouse tomatoes". He estimates that when infection occurs early, the yield may be reduced by at least 20%. He relates that, "In spite of . . . extreme precautions the spread of mosaic has worsed (at Merton and now at Bayfordbury) year by year and in 1953, with the exception of one house, we had 100 per cent infection everywhere. This one house we were able to keep entirely free of mosaic by spraying at ten-day intervals with milk diluted in nine parts water and sprayed on through an atomiser in sufficient quantity to give a good cover to the leaves". His recommendation is to spray with 10% solution of skimmed milk before pricking out and regularly at ten day intervals afterwards. "It is particularly important to spray before handling the plants rather than afterwards. Infection must be prevented -- it cannot afterwards be cured". (I.L.C.).

In a paper entitled, "Some Viruses of the Field Tomato" to appear in the Plant Dis. Reporter, Blair H. MacNeill reports on a survey that he has made of the mechanically transmitted viruses occurring in field tomatoes in Ontario in 1952 and 1953. Tobacco mosaic virus (*Nicotiana virus 1*) was the most common virus in seedlings before transplanting and after the plants are set in the field. It causes a mild mottle with little or no distortion. Streak symptoms were common. They were caused by *Lycopersicum virus 1*, apparently a strain of TMV but for the most part they are due to the combined action of TMV and *Solanum virus 1* (potato X virus). Etch (*Nicotiana virus 7*), which frequently causes only a faint mottle and slight curl, is confined to s.w. Ont. Contrary to expectations the virus was not present in imported seedlings from the southern United States. There is considerable evidence that etch virus drastically reduces tomato yields by inducing flower drop. Cucumber mosaic virus was infrequently isolated from the samples. Some strains produce the familiar "shoe-string" symptoms, although this reaction is often the result of TMV infection. On two successive years tomato spotted wilt (*Lycopersicum virus 3*) was found in a field in the Fort Erie district.

Undoubtedly tomato streak accounts for the major part of the visible crop loss. The incidence of double virus streak is increased if potatoes are growing nearby or if tomatoes are planted in fields in which potatoes were grown the previous year. The situation is complicated by the occurrence of necrotic strains of TMV and the presence of *Solanum virus 2* (potato Y). There is little evidence that viruses that are exclusively insect-borne are of great significance in the Ont. canning districts yet the role of insects in spreading many of the viruses noted above must be considered, especially where related susceptible crops are grown contiguous to tomatoes or where lack of weed control permits the presence of weeds that may act as reservoirs of tomato viruses (I. L. C.).

PURPLE TOP (virus) was found affecting 3 plants in a garden at Doak, N.B. The virus was transmitted by grafting to Bonny Best tomato and Katahdin potato. Typical bunch (purple) top symptoms developed in the plants (D. J. MacLeod).

BLOSSOM-END ROT (non-parasitic) was present on greenhouse-grown fruits from Carmacks, Yukon (H. N. Racicot). As usual, blossom-end rot affected a considerable percentage of the fruits found in canning crops in Essex Co., Ont., in August, when transpiration was high and precipitation was low (C. D. McKeen). It caused mod. damage in a field at Port Weller, Ont. (G. C. Chamberlain) and at Normandin, Que. (L. J. Coulombe). About 15-20% of the fruit were injured in a field at Rougemont (R. Crete). Little blossom-end rot was seen or reported in Kings Co., N.S. (K. A. Harrison).

BLOTCHY RIPENING (non-parasitic). Many of the new hybrids and crosses seem particularly subject to the disorder. Several growers in



Kings Co., N.S., reported some loss from the trouble (K.A.H.).

POTASH DEFICIENCY. In a half-acre planting at Malvern Square, N.S., about 75% loss of crop occurred; tests showed the soil was very low in potash (K.A.H.).

SUNSCALD. Mod. injury was reported by a grower at Ste Rose du Lac, Man. (J.E. Machacek).

CHEMICAL INJURY. 2,4-D caused foliage distortion and uneven ripening of fruits in a few canning crops in Essex and Kent counties, Ont. (C.D. McKeen).

In a field at Berwick, N.S., a grower sprayed a sprinkler irrigated crop of Early Chatham with a heavy application of Bordeaux to check a sev. outbreak of late blight. Blossoms were abundant and open at the time. As a result they failed to set fruit causing an estimated loss of 1500 baskets (20% of crop) (K.A. Harrison).

### TURNIP

LEAF SPOT (Alternaria brassicicola) was abundant on swede turnips in plots at Ste Foy, Que., in September (D. Leblond).

SOFT ROT (Erwinia carotovora) caused a heavy loss in 150 bags of Laurentian swedes in storage at St. John's, Nfld. (G.C. Morgan).

DOWNY MILDEW (Peronospora brassicae) was general on foliage of Laurentian at Courtenay, B.C.; no evident damage (W. Jones).

DRY ROT (Phoma lingam) was found on swede roots shipped from Alta. and on sale in a store at Sidney, B.C. The pathogen was isolated (W. Jones).

STORAGE ROT (various organisms). A survey of swede stecklings of 25 seed growers in June revealed that stecklings of 8 growers were a complete loss and others suffered 5-75% loss. Organisms recognized or isolated were: Phoma lingam, Rhizoctonia solani, Botrytis cinerea, Sclerotinia sclerotiorum, Fusarium spp. and Penicillium spp. (K.A. Harrison).

CLUB ROOT (Plasmodiophora brassicae) affected about 15% of the plants in 1/2 acre planting of Laurentian at Kingsport, N.S.; loss 10% (K.A.H.).

ROOT ROT (Rhizoctonia solani). Sclerotia were numerous on 2% of the roots in a planting near Taber, Alta. (M.W. Cormack). Some affected Laurentian roots were seen in P.E.I. Isolations yield R. solani (K.W. Harrison, J.E. Campbell).

SCAB (Streptomyces scabies) was mod. -sev. on two swedes received from Belleville, Ont. (H.N. Racicot).

BLACK ROT (Xanthomonas campestris). A few roots of Laurentian from Belmont, P.E.I., showed typical symptoms of black rot in the crown and root; infection tr. (J.E. Campbell).

MOSAIC (virus). Only two infected plants were seen in a field in Hants Co., N.S. (K.A. Harrison).

STERILITY (virus) Four plants showing marked phyllody were seen in a small seed plot at Taymouth, N.B. (D.J. MacLeod).

BROWN HEART (boron deficiency) was reported in several small lots of swedes in Kings Co., N.S.; the growers had neglected to apply boron. One grower at Grand Pre claims that boron deficiency has never affected his crops although he has never added boron. He uses manure under his crop (K.A. Harrison). A small amount of brown heart was present in the plots at Upton, P.E.I., where boron had not been applied (J.E. Campbell). Brown heart caused sev. losses in 4 small plantings of Laurentian at Clarkes Beach, Nfld. Specimens showing brown heart and soft rot were received from Burin (G.C. Morgan).

### WATERMELON

ANTHRACNOSE (Colletotrichum lagernarium). A sev. infection was present in a small planting at Altona, Man. (J.E. Machacek). The disease was quite common in an acre planting in Lincoln Co., Ont. (J.K. Richardson).

#### IV. DISEASES OF FRUIT CROPS

##### A. POME FRUITS

##### APPLE

**FIRE BLIGHT** (Erwinia amylovora) was common in the Edmonton area, Alta. (A.W. Henry, W.P. Campbell). Diseased material from Weyburn and Saskatoon, Sask., was seen. Fire blight was not conspicuous this year; the season was wet but the temperatures low. The disease is less prevalent than formerly as susceptible varieties are being replaced by resistant ones (T.C. Vanterpool). After a lapse of several years when fire blight was not observed in s.w. Que. it suddenly made its appearance and was found rapidly spreading in some orchards about Hemingford and Franklin Centre. The varieties most affected were Yellow Transparent, Golden Russet, St. Lawrence and Fameuse. Active cankers were present on limbs and main branches and numerous blossom clusters were infected. In the infected orchards the disease was restricted to groups of 20-50 trees, but prompt action should be taken to clear up the outbreaks (L. Cinq-Mars). A sl. infection was seen at St. Joachim, n. Gaspé Co., Que. (H. Genereux).

**RUST** (Gymnosporangium clavipes). Very few affected apples were seen in the Annapolis Valley, N.S., despite plentiful inoculum on the juniper (J.F. Hockey).

**BROWN ROT** (Monilinia fructicola) affected scattered fruits injured by insects in an orchard at St. Catharines (G.C. Chamberlain).

**BLACK ROT** (Physalospora obtusa). Sl. affected leaves were collected by C. Perrault at Montmagny, Que.; it was also observed at the Station, Ste Anne de la Pocatiere (H. Genereux). A sl. general infection was noted at harvest on Cortland throughout a large orchard at Woodville, N.S. (D.W. Creelman).

**POWDERY MILDEW** (Podosphaera leucotricha). Several affected twigs were received from the City Gardens, Vancouver, B.C. (I.C. MacSwan). The disease affected a few terminal shoots in the laboratory orchard, St. Catharines, Ont. (G.C. Chamberlain). Twig infections were prevalent on young trees obtained from a nursery at Port Burwell, Ont., and planted out at Southport, P.E.I. On 100 McIntosh trees, 74% showed one or more twig infections and on a few trees practically all the foliage was attacked. On 200 Cortland the infection was 30% and on 200 Crimson Gravenstein 21%. Some trees may not survive (J.E. Campbell).

**ROOT-LESION NEMATODE** (Pratylenchus penetrans Cobb). A 30% infection was found on East Malling VII and IX root stocks at Keating, B.C.; damage appeared sl. (J.E. Bosher).



**SILVER LEAF (*Stereum purpureum*)**. A tr. infection was seen on Cortland at Coldbrook, N. S. (C.O. Gourley).

**SCAB (*Venturia inaequalis*)**. A mod. infection was reported from St. Paul, Alta (A. W. H.); it also occurred on crabapples from Spruce Grove, near Edmonton (S.B. Hrushovetz). Scab was present on crabapples received from two places in s.e. Sask. (R.J. Ledingham). Scab was abundant on both the leaves and fruits received from St. Eustache and Poplar Point, Man. (W.A.F. Hagborg).

Scab was negligible in well sprayed apple orchards in the Niagara Peninsula, Ont. In the laboratory orchard, St. Catharines, fruit from unsprayed trees showed 50% scab, whereas on sprayed trees scab was from under 1-3%. Some scab development occurred late in the season and resulted in some storage scab. Storage scab was present on fruits forwarded from Toronto and taken from a carload of B.C. Winesap apples (1953 crop) (G.C. Chamberlain). Specimens received from several places in e. Ont. showed that scab was sev. in home gardens, which were not or inadequately sprayed (H.N. Racicot). Weather conditions were very favourable for the development of scab in s.w. Que. Over 5 in. of rain fell in May and in June; July was somewhat drier, but August and September were rainy. There were 3 heavy infection periods in both May and June. The first general appearance of scab took place 26-28 May. In unsprayed and neglected orchards and also in ones where fungicide sprays were not well timed, 60-100% of the fruits were scabby. Most orchardists who protected their trees well harvested a fairly clean crop despite the adverse weather conditions (L. Cinq-Mars). Most of the growers of the Frelighsburg district secured clean crops through the use of the organic fungicides Crag 341, and captan and the organic mercurials (R. Desmarteau). A tree in a home garden at Lachute was almost defoliated by scab (H.N. Racicot). Scab was sev. on foliage and fruit in plantings along the Lower St. Lawrence (H. Genereux). The disease was somewhat lighter about Lake St. John, but very susceptible varieties such as McIntosh bore invariably very scabby apples (L.J. Coulombe). Apple scab was sev. throughout the Saint John River Valley, N.B. and caused an estimated 70-80% loss in grade. (J.L. Howatt, S.R. Colpitts).

The practice of growers of applying organic mercury fungicides as an emergency measure after severe infection periods is greatly improving apple scab control in commercial orchards in N.S. Unsprayed orchards were defoliated in September, thus, conditions had been favourable for fungus development. There were 18 infection periods during May, June and July; 4 periods were rated as sl., 6 as mod. and 8 as sev. Conidia were first observed on the foliage on 26 May and by mid-July foliage infection was sev. in uncared-for orchards. Late fruit infections were observed on 20 Sept. and in a few orchards they were sev., affecting 40% of the fruit on 15 Oct. (J.F. Hockey). Apple scab was difficult to control even in well-sprayed orchards in P.E.I. In one small orchard

excellent control was obtained by 2 applications of Puratized followed by applications of Orthocide (R. R. Hurst).

MOSAIC (virus) affected 4 Cortland trees in a 2-acre block in an orchard at Sheffield Mills, N.S.; two trees were bearing an apparently normal crop (J. F. Hockey).

BITTER PIT (non-parasitic) caused mod. damage to a crop of Northern Spy grown at Nanaimo, B.C. (W. Jones).

CHLOROSIS (iron deficiency) was conspicuous this year in crabapple trees in Sask. The cold wet season probably reduced the availability of iron and possibly nitrogen (T. C. Vanterpool). An occasional tree was affected in the Winnipeg area, Man. (J. E. Machacek).

MAGNESIUM DEFICIENCY. About 50 young McIntosh trees in an orchard at Frelighsburg, Que., bore sev. burned leaves, clearly indicating magnesium deficiency (R. Desmarteau). Sev. foliage symptoms of magnesium deficiency were noted in the spray plots at Cambridge, N.S. The disorder was most sev. on plots sprayed with ferbam where up to 80% of the foliage was affected (J. F. Hockey). Magnesium deficiency was mod. in 3 large orchards on McIntosh, Cortland and Delicious at Southport, P.E.I. (J. E. Campbell).

SILVER LEAF (non-parasitic). Two young McIntosh trees were seen at Knowlton, Que., where the foliage showed the characteristic symptoms of silver leaf. No Stereum purpureum was found, but each tree bore a canker at the crown (R. Desmarteau).

SPRAY INJURY. McIntosh apples received from Easton's Corners, Ont. showed injury from arsenicals as described by W. C. Dutton (Mich. Spec. Bull. 218, 1932) (H. N. Racicot). Considerable yellowing and drop of leaves occurred in a block of Delicious in an orchard in Haldimand Co.; captan was used after an application of sulphur. Severe fruit russet occurred after application of Nirit in the cover spray in the plots at St. Catharines. The injury was so sev. that the fruits were unmarketable. The Nirit supplied in 1954 contained trace elements including small amounts of copper. Injury did not occur in Que., where the same material was used (G. C. Chamberlain).

STIPPIN (non-parasitic) affected almost the entire crop of 8 Red Spy trees in an orchard at Stoney Creek, Ont. (G. C. Chamberlain).

WATER CORE (non-parasitic) was reported to have affected most of fruit on a Strawberry tree, specimens received from London, Ont. (G. C. C.).

WINTER INJURY. About 100 trees mostly McIntosh were badly cankered and dying as a result of frost injury in previous years in a 1000-tree orchard at Wickham West, Drummond Co., Que. The site of the

orchard is not the best and for this part of Que. only hardy varieties should be planted (L. Cinq-Mars).

### PEAR

**FIRE BLIGHT** (*Erwinia amylovora*). Some twig and spur blight was observed in a young Bartlett orchard at Jordan, Ont. No reports of sev. infections were received this year (G.C. Chamberlain). A sl. infection was observed in a young home orchard in Queens Co., P.E.I. The disease had killed one tree in the orchard, which was set out in 1953. It is believed the disease was present in the nursery stock when planted (J.E. Campbell).

**SOOTY BLOTCH** (*Gloeodes pomigena*) was reported quite common on pears held in storage for processing in the Niagara Peninsula, Ont. The fruit was apparently clean when harvested, but its appearance was considerably marred by the blotch when the pears were removed from storage for processing (G.C. Chamberlain).

**BROWN ROT** (*Monolinia fructicola*) was on pear fruits injured by insects in Lincoln, Ont. The high incidence of brown rot on stone fruits may account for the appearance of this pathogen on pome fruits in 1954 (G.C.C.)

**ROT** (*Phytophthora cactorum*) destroyed 15-20% of the Kiefer pears (see Plate 1, fig. 3, p. 100) held in common store for processing in Lincoln Co., Ont. As a result of heavy rains in early and around the middle of October, containers of fruit were exposed to splashing and flooding, which carried the spores from the soil to the fruit. Fluctuating temperatures during storage provided conditions favourable for the development of rot. Fruit on low heavily laden branches also became infected (G.C.C.). The pathogen was first identified in Canada in 1919 by H.T. Gussow (Agr. Gaz. Canada 6:951-952, 1919), who isolated it from decaying pear fruits received from Kentville, N.S. It was first reported in the United States by H.H. Whetzel and J. Rosenbaum (Phytopathology 6:89-90, 1916); the senior author observed it in July 1915, causing a rot of half-grown apples on trees in his garden at Ithaca, N.Y. (I.L.C.).

**PEAR BLAST** (*Pseudomonas syringae*) killed about 75% of the bloom in one orchard and a trace of the disease was present in several others in the Saanich peninsula, B.C. In one nursery large cankers were present in twigs and branches of 4% of the trees. The disease first attracted the writer's attention in 1953, when it caused an epidemic of blossom and twig blight. Often several neighboring spurs are killed with the result that there are barren regions on the branches. There is considerable evidence that the disease has been present on pear for several years although rarely could it have been as destructive as in 1953 (W.E. McKeen). In 1932, F.M. Clara (Science 75:111, 1932)



described Pseudomonas utiformica as the pathogen of a new pear disease. The organism had been isolated from pear cankers supposedly affected by fire blight at Ithaca, N. Y., June 1931. The name, pear blast, was first used by H. R. Rosen (Phytopathology 22:23-24, 1932) for a blossom blight of pears he found in Arkansas. The same name was used by H. E. Thomas and P. A. Ark (Calif. Agr. Exp. Sta. Bul. 586, 1934) for the disease in California. E. E. Wilson (Hilgardia 10:213-240, 1936) was apparently the first to show that the pathogen was best referred to Pseudomonas syringae (I. L. C.).

SCAB (Venturia pirina) was rather heavy on 20% of the fruit in a Bartlett orchard at Ridgeville, Ont. (G. C. Chamberlain). Infection was sev. on young trees in a nursery at Ottawa (H. N. Racicot). Scab caused a 50% loss of crop on unsprayed Bartlett trees at Kentville, N. S. (C. O. Gourley).

STONY PIT (virus). The crop of 2 Anjou trees, in Lincoln Co., Ont., infected by this virus were badly pitted and unsaleable (G. C. Chamberlain).

## QUINCE

RUST (Gymnosporangium clavipes) affected about 2% of the fruit at the Station, Kentville, N. S. (C. O. Gourley).

## B. STONE FRUITS

### APRICOT

CORYNEUM BLIGHT (Clasterosporium carpophilum) was mod. on leaf specimens received from Oshawa, Ont. (H. N. Racicot).

BLOSSOM BLIGHT (Monilinia fructicola) destroyed 20-30% of the blossoms in an orchard in sod in Lincoln Co., Ont.

BLIGHT. A disease resembling fire blight killed a few branches on many apricot trees in an orchard at Leamington, Ont. (C. D. McKeen).

### CHERRY

BLACK KNOT (Dibotryon morbosum) sev. infected trees in several areas in Nfld. (G. C. Morgan).

FRUIT ROT (Glomerella cingulata) was rather prevalent on fruit on trees along the Lower St. Lawrence, Que. About 60% of the cherries collected from a tree after the leaves had fallen were affected; typical conidia of this fungus were present. Another 15% were affected by brown rot (Monilinia fructicola) and 25% were sound except for pinhead spots. These unharvested cherries had a strong bitter taste (D. Leblond, D. B. O. Savile).

LEAF SPOT (Higginsia hiemalis) was very sev. causing premature defoliation of cherry trees along the Lower St. Lawrence from Mont Joli to Rivière du Loup, the area surveyed (D. Leblond). Leaf spot affected 10% of the leaves and caused some defoliation of several sour cherry varieties at Tupperville, N.S. Bing and Napoleon sweet cherries in the same orchard showed 20% infection and 5% defoliation on 25 July (C.O. Gourley).

BROWN ROT (Monilinia fructicola) caused complete loss of crop on unsprayed Napoleon trees in the laboratory orchard, St. Catharines, Ont. Regularly sprayed trees suffered a 1-2% loss. The disease was prevalent and sev. in many sweet cherry orchards particularly in the Grimsby area or elsewhere when the spray program had been inadequate. On 17 May, counts were made of stem rot on unsprayed trees in the laboratory orchard; percentage infected were: Black Tartarian 11.5, Windsor 15.2, Bing 15.3, Yellow Spanish 21.0, Governor Woods 22.0, and Napoleon 31.0 (G.C. Chamberlain). Some 1-2% of the fruits of both sour and sweet cherries were affected at the Station, Kentville, N.S. (C.O. Gourley).

POWDERY MILDEW (Podosphaera oxycanthae) A mod. infection was present on young Montmorency trees closely planted at St. Catharines, Ont. (G.C. Chamberlain).

WITCHES' BROOM (Taphrina cerasi). A mod. infection was seen on Bing trees in a home orchard near Victoria, B.C. (W. Jones).

### PEACH

CANKER (Cytospora leucostoma) caused sl. damage to trees of Early Red Fire in an orchard at Grand Pre, N.S. (C.O. Gourley).

SCAB (Fusicladium carpophilum). A tr.-5% infection was present on most varieties in an orchard at Tupperville, N.S. A leaf spot caused by this fungus affected about 10% of the leaves, causing dark spots up to 1/2 in. in diameter, at Avondale (C.O. Gourley).

BROWN ROT (Monilinia fructicola) was very troublesome on harvested fruit in the Niagara Peninsula and Essex and Kent counties, Ont. The following percentages of rot were recorded after the fruit was held one week; at Harrow, Elberta 65.8; at St. Catharines, Fisher 75; Yellow Swan 78, Rochester 80, Veteran 82, Red Haven 85, and Marigold 95. In a survey of peaches in cold store rot varied from 5 to 100% after 10 days. Differences in the amount of rot were due to source and spray program followed. (G.C. Chamberlain). Brown rot infection varied from a tr.-2% in peaches at Wolfville and Tupperville, N.S. (C.O. Gourley).

POWDERY MILDEW (Sphaerotheca pannosa). A s. infection caused some blemish on fruit of the early variety Marigold in an orchard at

Niagara-on-the-Lake, Ont. (G.C. Chamberlain).

LEAF CURL (*Taphrina deformans*) was very common in Vancouver and on the Lower Mainland. Nearly every tree was affected to some degree. Most trees were mod.-sev. infected, resulting in defoliation and the development of a second set of leaves. (I.C. MacSwan). About 90% of all terminal growth of 6 unsprayed Elberta trees in an orchard in Lincoln Co., Ont., was sev. affected. Where the dormant sprays were properly applied, the disease was well controlled (G.C. Chamberlain). Infections from tr. to 2% were present in most peach orchards in Kings, Annapolis and Hants counties, N.S. (C.O. Gourley).

BACTERIAL BLIGHT (*Xanthomonas pruni*). A 1% infection was seen on Early Red Fire in an orchard at Grand Pre, N.S. (C.O. Gourley).

X-DISEASE (virus) and WESTERN X-DISEASE (virus). In reporting the transmission of western X-disease virus by the leafhopper, *Colladonus montanus* (Van D.), H.R. Wolfe (Plant Dis. Repr. 39:298-299, 1955) remarks that "insect transmission of western X-disease . . . is being regularly obtained with the leafhoppers *Colladonus geminatus* (Van D.) and *Scaphytopius acutus* (Say), and has been demonstrated with *Fieberiella florii* (Stal) and *Keonolla confluens* (Uh!)." In 1954 R.M. Gilmer (Plant Dis. Repr. 38:628-629, 1954) was able to report that *Colladonus clitellarius* (Say) was a vector of X-disease in New York State. According to H.H. Thornberry (Plant Dis. Repr. 38:412-413, 1954) this leafhopper is also implicated as a vector in Illinois. As the distribution and prevalence of these leafhoppers in Canada may be of interest to readers of this Report, this information is included here through the kindness of Dr. Bryan P. Beirne of the Systematic Entomology Unit, Entomology Division, Ottawa. *Colladonus clitellarius*: widely distributed and locally common in s. Ont. and s. Que.; *C. geminatus* and *C. montanus*: widely distributed and locally abundant in s. B.C., the latter species especially so in dry regions; *Fieberiella florii*: Niagara peninsula, Ont. - introduced from Europe; *Keonolla confluens* common and widely distributed, sometimes very abundant locally especially on *Salix*, in s. B.C.; *Scaphytopius acutus*: Alaska and B.C. up to 4500 ft., N.W.T., Alta., Sask., Man., Que., N.S., and P.E.I. (I.L.C.).

POTASH DEFICIENCY. About 80% of the trees in an orchard of Golden Jubilee in Lincoln Co. Ont., were affected. The trees were thin with very unthrifty growth. Terminal growth was spindly, foliage colour poor, leaves rolled, and margins red and necrotic. Test of soil gave no reaction for potash (G.C. Chamberlain).

### PLUM

BLACK KNOT (*Dibotryon morbosum*) was reported as follows: infection sl. on Gold at the Station, Saanichton, B.C. (W. Jones); small



knots on 20 plum trees in a 3-year-old orchard on Lulu Island; sev. infection on most trees in the Yarrow district in the Fraser Valley (I.C. MacSwan); mod. infection of 8 Stanley prunes at St. Catharines, Ont.; considerable damage in a nursery of 2-year-old trees at Bowmanville (G.C. Chamberlain); mod.-sev. in small plantings in York Co. (C.B. Kelly) and Leeds Co. (H.N. Racicot). At St. Jacques de Prairie, Que., 19/24 trees from an Ont. nursery infected the following year. (E. Lavallee); present on a tree in a Montreal garden and on chokecherry at Contrecoeur (P. Duval); sev. infection in a planting at Fredericton, (S.R. Colpitts) and at Bathurst, N.B. (H.N.R.); heavy on a small Burbank orchard at Grand Pre, N.S. (C.O. Gourley) and in several gardens at Grand Falls, Lethbridge and Topsail, Nfld.; wild cherries along highway near Grand Falls heavily infected (G.C. Morgan)

SHOT HOLE (Higginsia prunophorae) was heavy on trees in a nursery at Rougemont and on trees at Wickham West, Que. (R. Crete).

BROWN ROT (Monilinia fructicola) affected 1% of the Burbank fruit in the Station orchard, Kentville, N.S. (C.O. Gourley). Noted at Southport, P.E.I. (J.E. Campbell).

PLUM POCKETS (Taphrina spp.) was heavy on the few fruit that had set on a tree in a garden at Burnaby, B.C. (G.R. Thorpe). Diseased specimens received from only one place in Sask. in 1954 (R.J. Ledingham). All fruits on two trees were affected in a garden in York Co., N.B. (J.L. Howatt).

PRUNE DWARF (virus). Although one Burbank tree at the Station, Kentville, N.S., showed foliage symptoms throughout the tree, it bore a good crop of fruit (C.O. Gourley).

GUMMOSIS (?non-parasitic) was again observed in the orchard at Southport, where it was found in 1953 (P.D.S. 33:96). A hard lump of gum which may exude in part is formed under the skin of the fruit (J.E. Campbell).

#### SAND CHERRY

BROWN ROT (Monilinia fructicola) caused the death of twigs and rotted green fruit at Ste Agathe, Man. (J.E. Machacek).

POCKETS (Taphrina flavorubra) was reported to have affected all the fruit on a "bush cherry" at Rosseau, Ont.; specimens received (H.N. Racicot).

C. RIBES FRUITSCURRENT

WHITE PINE BLISTER RUST (Cronartium ribicola) was sev. on leaves of black currant received from Mindemoya, Ont., and Carillon, Que. (H.N. Racicot). This rust caused heavy defoliation of black currant bushes at St. Prime whereas red currant was much less sev. affected (L.J. Coulombe). Blister rust was recorded on both black and red currants at the Station, Kentville, N.S. A heavy infection was recorded in one planting of black currant in Queens Co., P.E.I. (J.E. Campbell) and on the demonstration plots at Bay Robert, Nfld. (G.C. Morgan, H.N. Racicot).

ANTHRACNOSE (Drepanopeziza ribis) heavily spotted the foliage of white currants at Rimouski, Que. (D. Leblond).

RUST (Puccinia caricina) was found on red currant in the University plots, Edmonton, Alta. (W.P. Campbell). Sev. affected fruits were received from 2 places in s.e. Sask. (R.J. Ledingham).

POWDERY MILDEW (Sphaerotheca moss-uvae). A mod. infection on Red Lake at the Station, Saanichton, B.C. (E.R. Hall, W. Jones). Sl.-mod. infections in several plantings at Lethbridge and on currant specimens from Red Deer, Alta. (M.W. Cormack). Powdery mildew killed 60% of the young growth on the blister-rust-resistant black currants Coronet and Crusader at the Station, Kentville, N.S., whereas the infection was about 20% on the ordinary black currants Kerry, Clipper and Victoria (C.O. Gourley).

GOOSEBERRY

ANTHRACNOSE (Drepanopeziza ribis) mod. infected Oregon Champion in a nursery at Lulu Island, B.C. (W. Touzeau, W. Jones). A 25% infection caused sl. defoliation of Clark at the Station, Kentville, N.S. (C.O. Gourley).

WHITE PINE BLISTER RUST (Cronartium ribicola). A tr. infection was found on Poorman, Captivator and Fredonia at the Station, Kentville, N.S. (C.O.G.).

SEDGE RUST (Puccinia caricina) was reported on cultivated gooseberries at Ponoka and Edmonton, Alta., and on wild gooseberries at Evansburg, (W.P. Campbell, A.W. Henry). Affected specimens received from Cornwall, Ont. (H.N. Racicot). A tr. observed on Captivator at the Station, Kentville, N.S. (C.O. Gourley).

POWDERY MILDEW (Sphaerotheca moss-uvae) was sev. on a few bushes in a home garden near Victoria, B.C. (W. Jones). It was heavy

on the new growth of Poorman at the Station, Kentville, N.S. (C.O. Gourley). A sl. infection on the young fruit was seen at Southport, P.E.I. (J.E. Campbell).

#### D. RUBUS FRUITS

##### BLACKBERRY

CANE GALL (Agrobacterium rubi) usually causes very little damage to Himalaya blackberry in the Saanich Peninsula, B.C., but in 1954 it killed some plants and the others were unproductive. A period of cold weather when the temperature dropped suddenly in the winter 1953-54 was probably the cause of the disease becoming sev. (W.E. McKeen).

RUST (Kuehneola albida) was found affecting the canes of Thornless blackberry (Rubus laciniatus) at Abbotsford, B.C. The plants were originally imported from the United States (R. Stace-Smith). This rust has been rarely collected but it was reported on R. ?allegheniensis and R. ?canadensis from Berthierville, Que., in 1931 (P.D.S. 11:124) and probably occurs on blackberry more frequently than these few collections indicate (I.L.C.).

##### LOGANBERRY

CROWN GALL (Agrobacterium tumefaciens) affected 25% of the plants in an acre planting on Lulu Island, B.C. (I.C. MacSwan).

SEPTORIA LEAF SPOT (Mycosphaerella rubi). Infection was general and many of the leaves were very sev. infected in plantings on the Saanich Peninsula, B.C. The disease causes considerable damage annually (W.E. McKeen).

ROOT ROT (Phytophthora sp. Pythium spp., Rhizoctonia solani) was prevalent and caused considerable damage in some plantings on the Saanich Peninsula, B.C. (W.E. McK.).

ROOT-LESION NEMATODE (Pratylenchus sp.). Medium to large populations of a root-lesion nematode were found in the roots of Thornless loganberry plants imported from Olympia, Wash. (J.E. Bosher).

DRY BERRY (cause unknown). The damage caused by dry berry varied from planting to planting but it was estimated that 10% of the crop was destroyed in the Saanich Peninsula, B.C. (W.C. McKeen).

WINTER INJURY. A few fields in the Saanich peninsula, B.C. suffered sev. injury as a result of a sudden cold spell after a mild fall and in these plantings crop was reduced by 50%. The injury was most sev. in plantings where an abundance of nitrogen had been applied (W.E. McK.).



## RASPBERRY

CROWN GALL (Agrobacterium tumefaciens). Nearly every plant was affected in a 1/2 acre planting at Bolton West, Que. (E. Lavallee).

GREY MOULD WILT (Botrytis cinerea). A few small canes were seen in a Viking planting at Kentville, N.S.; the typical elongated sclerotia were present (K.A. Harrison). Grey mould affected about 20% of fruit in a Viking planting in Kings Co. (J.F. Hockey).

SPUR BLIGHT (Didymella applanata). A mod. infection was seen in a planting at Brandon, Man. (J.E. Machacek). Sev. diseased canes of Cuthbert and Latham were received from North Bay, Ont. A tr. infection was present on material from Trafalgar (H.N. Racicot). Spur blight was observed in about 25 plantings in the Montreal district, Que.; it was more sev. than usual (E. Lavallee). Infection was sev. in a planting at Montmagny (C. Perrault). Spur blight was present in most plantings examined in N.S. Infection was tr.-100%, av. 25%. One sev. infected young Newburg planting at Berwick was 60% defoliated (C.O. Gourley).

ANTHRACNOSE (Elsinoe venata) must have been sev. in a planting at Cardinal, Ont. as the fruits were drying up on the infected pedicels that were received (H.N. Racicot). Infection was sev. on new canes of Trent in a nursery near Levis, Que. (J. Ringuet). A few tips of the young shoots were sev. infected in a new planting of Milton at Kentville, N.S. Several older plantings of susceptible varieties have been discarded as unsuitable for N.S. (K.A. Harrison). A sl. infection was noted in a garden planting of Lloyd George at Keppoch, P.E.I. (J.E. Campbell). Infection was heavy on a small Taylor planting at Topsail and mod. on one of Viking at Manual, Nfld. (G.C. Morgan).

CANE BLIGHT (Leptosphaeria coniothyrium) was noted on canes, probably affected by winter injury, from Powassan, Ont. (G.C. Chamberlain).

YELLOW RUST (Phragmidium rubi-idaei). Mod. infection on the lower leaves in a Washington planting at Salmon Arm, B.C.; loss nil (I.C. MacSwan). Infection was very light this year on Washington in the Lower Fraser Valley. A light infection was also observed on the wild blackcap (Rubus leucodermis) on Saturna Island (R. Stace-Smith). Specimens collected at Billings Bridge, Ont. (C.B. Dalton, J.A. Parmelee).

LATE YELLOW RUST (Pucciniastrum americanum) was reported as heavy in a planting of Latham at Iroquois, Ont. (H.N. Racicot). This rust was observed on Newburgh, Gatineau, Viking and Ottawa, but not on Trent in plantings at Berwick, N.S.; it caused some premature defoliation in the more sev. infected plantings (C.O. Gourley).

POWDERY MILDEW (Sphaerotheca humuli). The perfect stage, which is not common about Vancouver, B.C., was collected on the salmonberry (Rubus spectabilis) in Stanley Park (H. N. W. Toms).

GREEN MOSAIC (virus) was sev. throughout a 2-acre planting of mixed varieties at Salmon Arm, B.C. Mosaic was common in Washington plantations on the Lower Mainland, but spraying against aphids in a year unfavourable for their build-up kept the disease in check (I. C. MacSwan). Some 3% of the plants showed sev. mosaic in a Latham planting at Lower St. Mary's, N.B. (D. J. MacLeod). A tr. was seen in Ottawa, Viking and Chief in plantings at Berwick, N.S. (C. O. Gourley). Sl. infection in 2 Latham plantings at Topsail, Nfld. (G. C. Morgan).

WINTER INJURY caused considerable damage in plantings at St. John's, Topsail and Manuels, Nfld. (G. C. Morgan).

## E. OTHER FRUITS

### BLUEBERRY

BLOSSOM and TWIG BLIGHT (Borerytis cinerea and Monilinia vaccinicorymbosi) infected a tr. -100% of the plants in the fields at Tower Hill, Charlotte Co., N.B. Vaccinium myrtilloides, V. angustifolium and its varieties were affected. Damage ranged from the killing of single blossom or leaf clusters to the wilting of stems and complete defoliation. No estimate of the loss was attempted. In 1954, B. cinerea was more prevalent than the Monilinia (I. V. Hall). The disease was present in a field near Kentville and in several fields near Parrsboro, in Cumberland Co., N.S. (J. F. Hockey).

WITCHES' BROOM (Calyptospora goeppertiana) was very prevalent in newly burned blueberry fields adjacent to woods near Musquodoboit, N.S. Scattered plants were affected in old fields in Cumberland Co. (J. F. Hockey) and a 1-5% infection was recorded in a field near Bridgewater (D. W. Creelman).

RED LEAF (Exobasidium vaccinii) was present in all areas visited in N.S. In a few fields 25-30% of the plants were affected but in most infection was less than 1%. On sprout plants, the symptoms persisted until late September (J. F. Hockey).

CANKER (Godronia cassandrae) affected 3 plants in a patch of 50 plants in Kings Co., N.S. (J. F. Hockey).

LEAF RUST (Pucciniastrum vacciniorum) caused some late season defoliation on one-year-old sprout plants in fields in Kings Co., N.S. tr. infections were seen near Bridgewater (J. F. H., D. W. C.).

LEAF SPOT (Ramularia effusa). A tr. infection was observed on V. angustifolium at Italy Cross, Lunenburg Co., N.S. (D. W. C.)

## CRANBERRY

END ROT (Godronia cassandrae, Fusicoccum putrefaciens). A grower from Auburn, Kings Co., N.S. brought in on 11 Jan. 1955 a sample of rotting berries from a lot that was not keeping well. When the berries were cultured 80% yielded F. putrefaciens. This figure of end rot is over twice as high as that found in U.S. berries (K.A. Harrison).

## GRAPE

DEAD ARM (Fusicoccum viticola) affected 30% of the vines and caused sev. damage in a Concord vineyard at Milton, Ont. In many vines the disease had advanced along the vine, causing extensive trunk lesions, which would result in the loss of much bearing wood. In the Niagara peninsula, dead arm is present to some extent in all older vineyards. There was a low incidence of the shoot-lesion phase in 1954 (G.C. Chamberlain).

BROWN ROT (Monilinia fructicola) A scattered infection was seen on berries of Seibel 9110 injured by the berry moth in a vineyard at St. Catharines, Ont. Later the rot spread to affect a large part of each cluster (G.C.C.).

DOWNY MILDEW (Plasmopara viticola) affected about 10% of the vines of Fredonia, causing the destruction of the fruit clusters, in a vineyard at St. Catharines, Ont. Infection was also considerable on vines of Seibel 7053 and sl. on Van Buren (G.C.C.). The disease was apparently heavy in a small unsprayed planting at Seelys Bay, probably the crop would be a total loss. These vines were also mod. injured by 2,4-D (H.N. Racicot). Downy mildew affected a small garden planting at St. Jean, Que. (R. Crete).

POWDERY MILDEW (Uncinula necator) was common late in the season in vineyards in the Niagara peninsula, Ont. A mod. infection was recorded in one Concord vineyard in Lincoln Co. (G.C. Chamberlain). A grower in Annapolis Co., N.S., claimed sev. loss from powdery mildew on muscat grapes being grown under glass; specimen received (J.F. Hockey).

POTASH DEFICIENCY. Marked symptoms of potash deficiency were apparent in many vineyards of different varieties in the Niagara peninsula, Ont. In one vineyard the variety Buffalo was mod. defoliated (G.C.C.).

## STRAWBERRY

GREY MOULD (Botrytis cinerea) Rot of fruit was reported to be of little importance in the Vineyard-Jordan district, Ont., especially in



vigorous plantings and where they were irrigated. Rot affected 5-10% of the fruit in a Premier planting in Lincoln Co. (G.C. Chamberlain). Grey mould caused a 1-2% loss of berries in plantings of Premier, Senator Dunlop, etc. in Kings Co., N.S. (C.O. Gourley). Captan gave excellent control of the disease (J.F. Hockey).

**GANGRENE** (*Botrytis cinerea*, etc.). Damage was sev. in Premier, mod. in Senator Dunlop and sl. in King at the Station, Normandin Que. (L.J. Coulombe).

**LEAF BLIGHT** (*Dendrophoma obscurans*) mod. infected *Fragaria virginiana* at the Station, Kentville, N.S. (G.O. Gourley).

**LEAF SCORCH** (*Diplocarpon earliana*). Tr. infections were present on specimens received from Breslau, Ont., and Stanstead Que. (H.N. Racicot). Infection was very light on commercial varieties in N.S. throughout the season (C.O. Gourley).

**PETIOLE BLIGHT** or **LEAF BLOTCH** (*Gnomonia fructicola*) was sev. on specimens received from Breslau, Ont., and Stanstead, Que. (H.N. Racicot). A tr. was seen on Senator Dunlop in Kings Co., N.S. (C.O. Gourley).

**LEAF SPOT** (*Mycosphaerella fragariae*). Sev. infection in a garden at Brandon, Man. (J.E. Machacek). Infection sev. on specimens from Verner, and tr. at Breslau, Ont., and Stanstead, Que. (H.N. Racicot). In a variety trial at Deschambault, leaf spot was sev. on Louise, sl. on Valentine and Senator Dunlop, and absent on Premier, Dresden and Catskill (J. Ringuet). A mod. infection of Senator Dunlop was recorded in June at Gagetown, N.B. (S.R. Colpitts). Leaf spot was first observed in Kings Co. N.S., on 20 May. Weather was ideal for the spread of the disease and by fall unprotected plantings were 100% infected. Captan was especially effective in controlling the disease (C.O. Gourley). A sl. infection was noted on Senator Dunlop in a planting in Queens Co. P.E.I., in early June (J.E. Campbell).

**RED STELE** (*Phytophthora fragariae*) affected 30% of plants in a poorly-drained 1-acre planting of Premier in Lincoln Co., Ont. (see Plate 1, fig 4, p. 100). Many of the plants in the affected spots were destroyed. Source of plants unknown. This was the first definite occurrence of red stele in the Niagara peninsula (G.C. Chamberlain).

**FRUIT ROT** (*Rhizopus* sp.) affected scattered fruits in a planting, Queens Co., P.E.I. (R.R. Hurst).

**POWDERY MIDDLEW** (*Sphaerotheca humuli*) infection was quite heavy on the foliage in the Seaside peninsula, B.C. When the disease is sev. on the foliage the berries are also affected causing a reduction in the grade. Spraying with a combination of sulphur and captan reduced

infection and resulted in brighter fruit (W. Jones). A sl. infection was noted at the Station, Kentville, N.S. (C.O. Gourley).

WILT (Verticillium ?dahliae). Up to 50% of the plants were affected and caused considerable damage in plantings in the Saanich peninsula, B.C. The disease lowers productivity of the plants and shortens the life of the planting. In one field no marketable berries were harvested in 1953. The disease apparently has been present for some time (W.E. McKeen). A single wilted plant was seen in a garden at Sillery, Que. (D. Leblond).

DEGENERATION (virus). Many of the plants were affected in 2 Senator Dunlop nurseries in Bellechase Co., Que. The plants were smaller than normal and showed symptoms resembling crinkle or those of witches' broom. The nurseries were condemned to prevent the spread of the disease (J. Ringuet).

JUNE YELLOWS. In 2 Premier plantings in Lincoln Co., Ont., almost all the plants showed yellows on the new leaves. In one planting Premier plants from a different source were normal and free of yellows. The affected plantings were both from the same source and showed yellows in 1953 (G.C. Chamberlain). June yellows affected 90% of the plants in a planting of Louise in Kings Co., N.S. (C.O. Gourley).

ROOT ROT (cause undetermined) affected the plants over a considerable area in a planting at Brandon, Man. (J.E. Machacek). Root rot caused mod. damage to a Senator Dunlop planting in Queens Co., P.E.I. Roots were blackened, with very few side roots and root hairs present. Isolations yielded a variety of organisms (J.E. Campbell).

?LOW TEMPERATURE INJURY. Collapse of British Sovereign plants during hot weather has become general in plantings in the Fraser Valley, B.C.; this collapse has caused sev. economic loss to many growers. More and more growers are discarding British Sovereign for the Northwest variety. The cause of the trouble is uncertain, but it has been attributed to low temperature injury to the crowns. (I.C. MacSwan, W.R. Foster).

## V. DISEASES OF TREES AND SHRUBS

### ABIES - Fir

Witches' Broom (Melampsorella caryophyllacearum). About 10% of the trees showed one or more brooms in a stand of A. balsamea near New Germany, Lunenburg Co., N.S. (D.W. Creelman).

### ACER - Maple

Canker (Cystospora chrysosperma) was found affecting 300 young trees of Norway maple (A. platanoides) both in the City Nursery, and along the streets of Montreal, Que. (J.E. Jacques).

Leaf Spot (Phleospora aceris) was general and widespread on maples in western N.S.; infection 10-100%; damage mod. (D.W. Creelman).

Tar Spot (Rhytisma acerinum) was prevalent on A. saccharinum about the Montreal district, and Joliette, Sorel, etc. I have never seen the infection so heavy (F. Godbout). Leaves of silver maple heavily spotted on private property in Montreal (P. Duval). Extremely heavy infections were observed on A. rubrum at New Ross, N.S. (D.W. Creelman).

### AESCULUS - Horsechestnut

Leaf Blight (Guignardia aesculi) was sev. on A. hippocastanum at Lunenburg, Mahone Bay and Bridgewater, in Lunenburg Co. and also in Kings Co. Although the disease is easy to control with 2 sprays of ferbam, few towns have the necessary equipment (D.W. Creelman, C.D. Gourley). A mod. infection was observed on A. carnea var. brioti at Southport, P.E.I. (J.E. Campbell).

### AMELANCHIER

Rust (Gymnosporangium clavariaeforme) was sev. on Amelanchier at Ste Anne de la Pocatiere, Que. (H. Genereux).

### BERBERIS - Barberry

Rust (Puccinia graminis). Sl. infections were found by Plant Protection inspectors (a) on the understock which has overgrown the scion, B. koreana in a nursery at Cooksville, Ont.; (b) on four barberries in a hedge row of many deciduous and evergreen plants in a semi-formal garden in a nursery at Clarkson. In neither instance is the identity of the barberry known, but at Clarkson it is probably not B. vulgaris (H.S. Thompson). The latter bushes are probably progeny of a hybrid variety, which has thrown some susceptible individuals. The other case points to the danger of using susceptible understock on which to propagate rust resistant species (I.L.C.). A mod. infection occurred on some bushes in the laboratory



nursery, Fredericton, N.B. (J.L. Howatt). Aecia were collected on 2 bushes of B. vulgaris var. purpurea at Kentville, N.S., on 12 June, infection 10% (D.W. Creelman); and on a bush of B. vulgaris in the park at Grand Pre (K.A. Harrison).

Wilt (Verticillium ?dahliae) was reported affecting a considerable number of plants of B. thunbergii in a 1/2 acre plot in a nursery at Cooksville, Ont.; specimen received (H.S. Thompson).

#### BETULA - Birch

Leaf Spot (Marssonina betulae Magn.) was found affecting leaves of B. papyrifera collected by C.A. Arthur at Barton, York Co., N.B. on 10 June 1954. The ascervuli are epiphyllous and most difficult to see. This appears to be the first record of its occurrence in North America (J.A. Parmelee).

#### CARAGANA

Leaf Spot (Septoria caraganae) has been common and conspicuous for years in Sask. towards the end of the season. Infection was sl. this year in spite of rainfall being above normal this year. Possible subnormal temperatures slowed up its development (T.C. Vanterpool).

#### CRATAEGUS - Hawthorn

Leaf Blight (Entomosporium thuenenii). Two bushes of the rose-flowered variety of C. oxyacantha were heavily defoliated while a white variety in the same planting at Kentville, N.S., showed little damage (D.W. Creelman).

Rust (Gymnosporangium clavipes) affected 50% of the fruits on bushes of C. oxyacantha at Kentville, N.S. (D.W.C.).

#### FRAXINUS - Ash

Leaf Spot (Gloeosporium aridum) sev. damaged the leaves of F. americana at Blomidon, N.S. (D.W. Creelman).

Rust (Puccinia sparganioides). Heavy infections were found at Canning, Kings Co., and at several places in Lunenburg Co., N.S. (D.W.C.). Rust was found only on a few trees in Queen Elizabeth Park, Summerside, P.E.I., but on these trees there was much swelling and distortion of leaves, petioles and twigs (J.E. Campbell).

#### HIPPOPHAE

?Crown Gall (Agrobacterium tumefaciens). A shipment of 250 trees of H. rhamnoides from Holland were found to have galls on the roots of

42 plants when examined at Southport, P. E. I. When the galls were placed in a moist chamber for 48-72 hours a gummy exudate appeared on the surface of the gall. A smear made of this material revealed gram-negative short rods in size similar to A. tumefaciens (J. E. Campbell). Charlotte Elliott (Manual of Bacterial Plant Pathogens ed. 2, 1951, p. 6) lists Elaeagnus as a host of A. tumefaciens (I. L. C.).

## JUGLANS

Leaf Spot (Marssonina juglandis) caused premature defoliation of many butternut trees (J. cinerea) in the Ottawa district, Ont. (H. N. Radcoct)

## JUNIPERUS

Rust (Gymnosporangium spp.) A sl. infection was observed on J. virginiana in a commercial nursery at Victoria, B. C. (W. E. Wood). When the specimen was examined at Ottawa it appeared to be G. tubulatum Kern, but the telia are not readily distinguishable from G. neesii (J. A. Parmelee). Telia of both G. juniperi-virginianae and G. clavipes were found sporulating on 3 May in Lincoln Co., Ont. The two rusts are common on red cedars in a waste area under observation. Infected twigs bearing the gelatinized telia of G. clavipes were brought to the laboratory from a foundation planting of J. virginiana vars. canaerti and glauca around a residence in St. Catharines (G. C. Chamberlain). Specimens of expanded telia of G. globosum on J. virginiana were sent from Bailieboro on 2 June. Specimens of G. clavipes on J. virginiana were brought in by a local Ottawa resident. The trees had been brought a few years ago from Belleville and set out here. This is the first time I have seen G. clavipes on J. virginiana growing here. It is possible that this chance introduction will be sufficient to establish the rust in Ottawa; it certainly has not been present previously. A heavy infestation of G. juniperi-virginianae was found in the fall of 1954 just e. of Seeleys Bay, Ont., by G. A. Ledingham. It occurs along a farm lane where young red cedar are growing in the fence row. Here and there is a wild apple tree. When the area was visited with Dr. Ledingham on 6 March 1955 the cedar apples that will fruit in 1955 had attained their full size and the position of the telia was plainly visible on the gall surface. The cedar apples that will fruit in 1956 can be detected as shining light-red hemispherical galls about 1/16 in. across subtended by the leaf in the axil of which the gall was formed. They would be easily overlooked except when they are abundant (I. L. Connors). G. clavipes was observed on a single juniper plant at Cote des Neiges, Montreal, Que. (F. Godbout).

## LONICERA - Honeysuckle

Leaf Blight (Herpobasidium deformans) Suckers and some young growth on many older trees were affected in gardens at Saskatoon, Sask. from June onwards in 1954; not bacterial (T. C. Vanterpool). Although

no specimens were seen an outbreak of H. deformans is suspected (I. L. C.). A mod. infection was seen at Knowlton, Que , and affected specimens were received from Boucherville and Sillery (H. S. Thompson). Sev. affected, practically defoliated specimens received from Beauharnois (H. N. Racicot). Leaf blight was general on L. spp. in Kings Co., N. S. (D. W. Creelman).

Powdery Mildew (Microsphaera alpi) was sev. on the foliage of L. tatarica var. alba and mod. on L. tatarica var. zabelii at Southport, P. E. I. (J. E. Campbell).

## MALUS

Scab (Venturia inaequalis) mod. infected a flowering crab at Charlottetown, P. E. I. (J. E. Campbell).

## PICEA - Spruce

Rust (Chrysomyxa ledicola). Infection was heavy on current season's needles of two specimen trees of blue spruce (P. pungens) on private grounds of a farm near Ottawa. Several white spruce (P. glauca) growing close by were only lightly infected. In Mer Bleu, 3-5 mi. away white spruce was completely rusted where growing near Ledum (J. A. Parmelee). A tr. was found on P. pungens at Meteghan, N. S. (J. F. Hockey).

## PINUS

Blister Rust (Cronartium ribicola). A specimen of rusted P. strobus was received from a resident of Montreal, Que (P. Duval). About 10% of the trees were affected in a young stand of P. strobus at the Station, Kentville, N. S. The blisters were just breaking on 12 May (C. O. Gourley).

## POPULUS - Poplar

Scab (Fusicladium radiosum) was sev. and destructive to leaves and twigs of young P. tremuloides as a result of frequent rain showers at Clearwater Bay, Ont. (W. L. Gordon). It caused considerable defoliation of P. grandidentata at Kentville, N. S. (D. W. Creelman).

Anthracnose (Marssonina ?brunnea) was quite general and caused mod. damage to P. grandidentata in Kings and Lunenburg Counties, N. S. (D. W. C.).

Anthracnose (Marssonina rhabdospora). Infections ranging from a tr. to 20% were observed on P. grandidentata at several points on the south shore in Lunenburg Co., N. S.; collections were made (D. W. C.). The perfect state (Pleuroceras populi Thompson, Mycologia 46:655, 1954) was obtained by overwintering leaves of P. tremuloides bearing ascervuli of Marssonina rhabdospora (Ell. & Ev.) Magn collected in the fall of 1936 at Ithaca and Freeville, N. Y. Although the conidial state



was first described from Populus grandidentata, the perfect state is still to be collected on this host (I. L. C.).

Rust (Melampsora medusae). Sev. rusted leaves of P. deltoides received from Portage la Prairie, Man., 31 Aug. (W. A. F. Hagborg).

Leaf Spot (Septogloeum rhopaloideum) (cf. P. D. S. 33:109). G. E. Thompson (Mycologia 46:658 1954) describes the perfect state of this fungus as Guignardia populi from overwintered leaves of P. tremuloides collected at Ithaca, N. Y. 13 May 1937. The perithecial primordia were observed to begin their development during late September and October. Development continued during the fall and the perithecia matured in the spring. The conidia and spermatia of the fungus are also known from one collection on P. balsamifera made at Elka Park, Green Co., N. Y. Sept. 1908 by H. S. Jackson. The author does not mention its occurrence on P. grandidentata (I. L. C.).

## PRUNUS

Scab (Cladosporium carpophilum) was present on a flowering plum at Lachine, Que. (P. Duval).

Black Knot (Dibotryon morbosum) was mod. on P. pennsylvanica at Grand Pre, N. S. (C. O. G.).

Shot-hole (Higginsia lutescens) heavily infected P. virginiana at Blockhouse, Lunenburg Co., N. S. (D. W. Creelman).

Powdery Mildew (Podosphaera oxycanthae). An extremely heavy infection was present on a hedgerow of P. pennsylvanica, 1/4 mi. long near Bridgewater, N. S.; the leaves turned yellow and defoliation was sev. on 20 July. Mature cleistotheca were abundant (D. W. C.).

## QUERCUS

Leaf Spot (Actinopelte dryina (Sacc.) Hoehn.). A specimen on Q. borealis collected at Rougemont, Que. on 9 July was received from L. Cinq-Mars. (See D. P. Limber and Edith K. Cash. Mycologia 37:129-137. 1945). Apparently this is the first Canadian record of this remarkable fungus (D. B. O. Savile).

Leaf Blister (Taphrina coerulescens) was again general on red oak (Q. borealis) in the Kentville area, and was also found at Nictaux, Annapolis Co., and at Mahone Bay, Lunenburg Co. N. S. Infection was quite heavy (D. W. C., K. A. H., C. O. G.).

## RHAMNUS - Buckthorn

Crown Rust (Puccinia coronata) sev. infected a hedge of R. cathartica at Sutherland, Sask., whereas in 1953 the infection was sl. Also hedges in the centre of Saskatoon, which were not rusted in 1953, were sl. infected in 1954. The infection this year at Sutherland is the heaviest that I have ever seen. A mod. infection was also seen on Eleagnus and Shepherdia bushes growing on the river bank at Saskatoon. These infections were also heavier than usual (T.C. Vanterpool). Aecia were abundant on 200 ft. hedge, planted over 20 years ago at Macdonald, Man. (W.A.F. Hagborg). Infections bearing aecia were extremely heavy on 10 June on the leaves, petioles, shoots and occasionally on the fruits of escaped bushes occurring single or in groups of 2-3 in a fence now chiefly of Prunus virginiana along a field e. of Kinburn, Ont. Most of the aecia were open or ready to open. Fence row grasses were chiefly two species of Poa and Phleum pratense. Oats had been sown on a portion of field next the fence row. Undoubtedly it became heavily rusted. The rust was collected the same day by Savile on escapes at the edge of the Arboretum, Ottawa (I.L. Conners, D.B.O. Savile). A sl. infection occurred on R. cathartica in the laboratory nursery and on the O'Dell estate, Fredericton, N.B. A sl.-mod. infection of P. coronata var. agrostidis occurred on scattered bushes of R. frangula at the Station, Fredericton (J.L. Howatt). Tr. infections were recorded on R. cathartica at Kentville and Wolfville, N.S. Traces of P. coronata var. agrostidis were found on R. frangula not only at the Station but also in several other areas about Kentville, where it had not been observed previously (D.W. Creelman).

## SALIX - Willow

Scab (Fusicladium saliciperdum) was sev. on S. fragilis at Ste Anne de la Pocatiere and other places on the Lower St. Lawrence, Que. A small infection was observed on S. laurifolia at Grande Riviere, Gaspé (H. Genereux).

Blight (Fusicladium saliciperdum and Physalospora miyabeana) was very sev. on susceptible willows in N.S. in 1954. The old French willows at Grand Pre park were sprayed 3 times, but the early sprays were omitted because the lawn was too wet to support the sprayer. As a result 50% twig blight developed (K.A. Harrison).

## SAMBUCUS

Leaf Spot (Ascochyta wisconsinensis). A 5% infection was present on S. canadensis at Kentville, N.S., on 15 Aug. (D.W. Creelman).

## SORBUS

Rust (Gymnosporangium cornutum) very heavily infected the native

mountain ash (Pyrus decora) at Clearwater Bay, Ont. The infection was unusually heavy this year as the leaves were practically covered with infection spots bearing pycnia and aecia (W.L. Gordon). (See also P.D.S. 33:111). Rust was observed in Kings and Lunenburg counties, N.S. Although the first mature specimens of this species were not collected until 1952 (P.D.S. 32:107) it appears to be widespread in the province (D.W. Creelman).

## TILIA

Anthracnose (Elsinoe sp.) was found causing sev. damage to T. europea and T. platyphyllos in the town of Lunenburg, N.S. The pathogen appears to be undescribed. Small purplish spots are formed on the leaves; these spots coalesce and the affected tissue falls out causing a shot-hole appearance. The spots have ascomata typical of Elsinoe; the identification was confirmed by Dr. Anna E. Jenkins (D.W. Creelman).

Anthracnose (Gloeosporium tiliae). A sl. infection was seen on T. tomentosa at Southport, P.E.I. Spots small, circular, brownish to greyish with dark border on the leaves (J.E. Campbell). The perfect state is Gnomonia tiliae Kleb., but it has yet to be collected on overwintered leaves in Canada (I.L.C.).

## ULMUS - Elm

Dutch Elm Disease (Ceratostomella ulmi). Of the samples received for culturing at Ottawa 328/453 yielded the pathogen. The 53 positives from Ont. were mostly from the Windsor area, Essex Co., but the first case for Haldimand Co. was found this year at Port Maitland. The 275 infected specimens from Que. indicated a marked increase of the disease at Sherbrooke (Ruth Macrae).

Coral Spot (Tubercularia ulmea) sev. infected a hedge of U. pumila at St. Joseph du Lac, Que., and was present in several gardens in Montreal (P. Duval). Affected specimens of Chinese elm were received from Saint John Co., N.B. (J.L. Howatt).



## VI. DISEASES OF ORNAMENTAL PLANTS

### ACONITUM - Monkshood

Yellows (*Callistephus virus 1*, eastern strain). Sev. yellows was observed in 11 plants in a garden in Fredericton, N.B. (D.J. MacLeod).

### ALTHAEA

Rust (*Puccinia malvacearum*) was common on hollyhock on Vancouver Island, B.C.; rust pustules present on the leaves in January (W. Jones). Infection was sev. at Edmonton and Taber, but sl. at Lethbridge, Alta. (W.P. Campbell, F.R. Harper). Specimens from Maple Creek, Sask., collected 1 August showed infection by both rust and a Leaf Spot (*Septoria malvicola*). The epiphyllous spots sometimes occurred directly over a hypophyllous rust pustule. According to R.C. Russell both diseases are new to Sask. (J.A. Parmelee). Conditions this summer were very favourable for the development of rust in Ont. and Que. Numerous specimens showing light to heavy infections were received (H.S. Thompson). A sev. infection was seen on *Malva neglecta* at St. Catharines, Ont. (T.R. Davidson). A rusted specimen received from a private garden in Montreal, Que. (P. Duval). Plants were rather heavily affected with rust at St. Eustache, Ste. Anne de Bellevue, St. Chrysostome and Franklin Centre (R. Crete). Sl. infection at Charney (H. Genereux). Rust was sev. on *A. rosea* at Kentville, N.S. (C.O. Gourley). Mod. infection in several plantings about Charlottetown, P.E.I. (J.E. Campbell).

### ANEMONE

Rust (*Tranzschelia pruni-spinosae*) was general in May on mixed varieties of *A. ?coronaria* at Brentwood, B.C. (W. Jones, D.B.O. Savile).

### ANTIRRHINUM - Snapdragon

Rust (*Puccinia antirrhini*) was heavy on snapdragons at St. Eustache, Ste. Anne de Bellevue, St. Chrysostome and Franklin Centre, Que. (R. Crete). Sev. infected plants were received from Montreal (P. Duval).

Yellows (*Callistephus virus 1*) sev. affected 1% of the plants in a garden in Fredericton, N.B. (D.J. MacLeod).

### BEGONIA

Grey Mould (*Botrytis cinerea*). Affected leaves received from Queens Co., P.E.I., showed fructifications typical of *Botrytis* (J.E. Campbell).

Powdery Mildew (?Erysiphe cichoracearum) was heavy on tuberous begonias in a garden at Toronto, Ont. Light-mod. infections were common in gardens at Ottawa. The wet season was favourable for the development of the disease (H.S. Thompson). Infection was so heavy that all the plants died in a commercial greenhouse at Chatham, N.B. (S.R. Colpitts).

Bacterial Blight (Xanthomonas begoniae) was general and caused sev. damage to tuberous begonias in a commercial greenhouse in Victoria, B.C. Plants were growing under unsanitary conditions, no spraying had been done (W. Jones).

## CALENDULA

Yellows (Callistephus virus 1). Infections of 2-5% were seen in 3 gardens examined in Fredericton, N.B. (D.J. MacLeod). Every plant was affected by yellows in late September in a small bed at Kentville, N.S. (K.A. Harrison).

## CALLISTEPHUS - China Aster

Wilt (Fusarium oxysporum f. callistephi) caused sev. damage in a garden at Medicine Hat, Alta. (F.R. Harper).

Yellows (Callistephus virus 1) caused mod.-sev. damage in many gardens in Lethbridge, Alta. (M.W. Cormack). Yellows was epidemic in early sown china asters, but was noticeably less prevalent in later plantings at Saskatoon, Sask. The virus also affected Tagetes, Zinnia, Phlox, Petunia, Mathicla, and Chrysanthemum. The following weeds were also found infected at Saskatoon: Canada fleabane (Erigeron canadensis L.), Toadflax (Linaria vulgaris Hill), Russian pigweed (Axyris amaranthoides L.), leafy spurge (Euphorbia esula L.), goatsbeard (Tragopogon dubius Scop.), purple cockle (Agrosterma githago L.), Lupinus sp., tansy (Tanacetum vulgare L.), catchfly (Silene sp.), stinkweed (Thlaspi arvense L.). Leaf hoppers, including Macrosteles fascifrons (Stal) 1/ were reported by the entomologists to be abundant and widespread this summer (T.C. Vanterpool). Yellows affected the dwarf variety Kirkwell Finest Mixed in the laboratory beds, St. Catharines, Ont. (W.G. Kemp). About 30% of the plants in the border at the Station, Fredericton, N.B., were affected by yellows (D.J. MacLeod).

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1/ From a study of the nearctic species of Macrosteles (Homoptera: Cicadellidae) Bryan P. Beirne (Canadian Ent. 84:208-232, 1952) concludes that the correct name of the 6-spotted leaf hopper, which was referred to by most North American authors as Cicadula sexnotata before 1937 and subsequently as Macrosteles divisa, is Macrosteles fascifrons (Stal) (I.L.C.).

## CAMELLIA

Blight (Pestalotia sp.). Affected specimens of C. japonica were intercepted in a shipment from Oregon. Numerous ascervuli developed in the moist chamber. Affected leaves were off-colour and somewhat twisted (W. Jones).

## CHRYSANTHEMUM

Grey Mould (Botrytis cinerea) caused a stem rot and wilt in one variety of C. morifolium in a greenhouse on Lulu Island, B.C. A 10% loss was estimated in a planting of 500 plants. Infection took place through the wounds made on the stem when the plant was disbudded (I. C. MacSwan).

Leaf Spot (Septoria chrysanthemella) sl. infected C. morifolium in a home garden in N. Vancouver, B.C. (A. D. Henderson, W. Jones). Sl. damage in a greenhouse in Lethbridge, Alta. by Septoria sp. (M. W. Cormack).

Yellows (Callistephus virus 1) affected a few plants of Spangler at Weston, Ont. The plants were started outdoors and then transplanted to raised greenhouse benches. After about 6 weeks, the plants were stunted and pale and the blooms a green colour (W. G. Kemp).

Stunt (virus) was suspected in Alexander Cummings, a hardy variety, at Port Burwell, Ont. Typical stunt symptoms appeared on healthy Pink Mistletoe 4 months after the infected plants were grafted on the indicator plants (W. G. Kemp).

Topple (non-parasitic) affected two varieties, Christmas Star and Christmas Greeting in a greenhouse at Regina, Sask. There was a collapse of the pedicels of many of the lateral heads (R. J. Ledingham). It is believed to have been brought about by physiological drought. This occurs when night temperatures are very low and day temperatures are permitted to rise rapidly. As temperatures rise rapidly during morning hours, conditions are favourable for rapid loss of water from the tops of the plants. On the other hand, soil temperature rises only slowly and on account of slow uptake of water by the roots, the lost water cannot be replaced rapidly enough. Collapse occurs at the upper limits of the pedicel as these vascular tissues are the most recently formed and movement of water is at the slowest rate. Christmas Star is a susceptible variety (A. P. Chan).

## CYCLAMEN

Grey Mould (Botrytis cinerea) caused a sl. spotting of the flowers on 2 plants received from a commercial florist at Sarnia, Ont., on 1 Nov. (W. G. Kemp).

Soft Rot (Erwinia carotovora). The leaf petioles and flower peduncles of plants from Sarnia, Ont., were affected by soft rot. The rot had almost completely destroyed the corm of one extremely dwarfed plant (W. G. K.).



## DAHLIA

Crown Gall (Agrobacterium tumefaciens). An affected plant received from the Station, Swift Current, Sask. (R. J. Ledingham, W. A. F. Hagborg).

Mosaic (Dahlia virus 1): 2% of the dahlia plants in a plot at the Station, Fredericton, N. B., showed sev. mosaic (D. J. MacLeod).

## DAPHNE

Leaf Blight (Marssonina daphnes). Infection was sev. on leaves of D. mazereum in a nursery at Vancouver, B. C. (W. Touzeau, W. Jones).

## DELPHINIUM

Powdery Mildew (Erysiphe polygoni) affected plants in a garden at St. Catharines, Ont. (G. C. Chamberlain).

Bacterial Blight (Pseudomonas delphinii) affected 20% of the plants in a garden at Quebec, P. Q.; a 10% infection was noted in a nursery near Montreal (J. Ringuet). The disease caused sev. damage to a planting in a garden at Kentville, N. S. (D. W. Creelman).

## DIANTHUS

Grey Mould (Botrytis cinerea) caused a bud blight on a few plants of carnation Northland only in a greenhouse in Sarnia, Ont. (W. G. Kemp).

Leaf Spot (Heterosporium echinulatum) Sl. affected carnations in a greenhouse in Brantford, Ont. This disease does not appear to have been recorded in Eastern Canada before (J. A. Parmelee).

Rust (Uromyces caryophyllinus). A mod. infection was recorded on carnation in a garden at Duncan, B. C. (W. Jones). A sl. infection was observed in single greenhouses at Sarnia, and Leamington, Ont. (W. G. Kemp). A sev. infection was checked in a greenhouse in Montreal, Que., by spraying with zineb at 10-day intervals (J. E. Jacques). Rust was heavy on carnations in greenhouse beds at Chatham, N. B.; 80% of the plants failed to bloom (S. R. Colpitts). A few plants were affected in a greenhouse at Oxford, N. S., in May (D. W. Creelman). A sl. infection was seen on carnations in a greenhouse at Southport, P. E. I., on 27 August (J. E. Campbell).

Pimple (Xanthomonas oryzae (Uyeda & Ishiyama) Dowson var. dianthi Thomas & Dickens). In May 1954, specimens of carnation (D. caryophyllus) received from a greenhouse in Leamington, Ont., showed small, clear pimple-like spots on the leaves and stems. The infection was reported to be fairly heavy on the variety Northland, but no others were affected. The cuttings had originally come from H. Yoder, Wooster, Ohio. The symptoms were similar to those described for carnation pimple by W. D. Thomas, Jr., and L. E. Dickens (Colorado Flower Growers' Assoc. Bull. 37. Nov. 1952 and Plant Dis. Repr. 37:634-635. 1953.). A bacterium was isolated from the material by W. D. Sutton and

the pathogenicity of the organism was demonstrated by inoculating unnamed carnation seedlings growing in the Horticulture greenhouses. Typical symptoms developed about 3 weeks after inoculation. After 3 months there was no further spread. When the crop at Leamington was seen there had been no further spread (A.P. Chan). As far as I can determine, the variety dianthi has yet to be formally published. (I. L. C.).

Mosaic (virus) was noted on a few plants of sweet rocket (D. barbatus) at Vineland, Ont. (T.R. Davidson).

?2, 4-D Injury. Sev. distortion of the leaf tips and abnormal development of the buds of Pimpernell carnation were observed in a greenhouse at Leamington, Ont. The circumstantial evidence strongly suggested that the plants had been injured by 2, 4-D. (W.G. Kemp).

## GLADIOLUS

Core Rot (Botrytinia draytoni (Buddin & Wakef.) Seaver). In a shipment from Holland inspected at Southport, P.E.I., on 2 Dec. hard rot (q.v.) sev. infected corms of Leeuwenhorst, but 2-5% of the corms also showed core rot. In a small lot of Pretoria corms, 12% were affected (J.E. Campbell). The transfer of the fungus from Sclerotinia to Botrytinia was made by F. J. Seaver in his North American Cup-fungi (Inoperculates), p. 62, 1951 (I. L. C.).

Leaf Spot and Corm Rot (Curvularia sp.). After a limited inspection of some 30 acres of gladiolus of one grower at Burlington, Ont., leaf spot was found on only the variety Gaylore, which, however, showed consistently mod. infection. At Huttonville, leaf spot also mod. infected a single variety Lake in a 25-acre planting. As a corm rot this pathogen has given some trouble to a grower at St. Eustache, Que., in Radiance ever since he began growing the variety some 10 years ago. However as the disease has only caused some loss in corms this florist has continued to grow the variety for the cut-flower trade. A second grower in the Montreal area has had considerably more trouble with corm rot and has had to cull his corms heavily to secure clean stock. The leaf spot phase was observed on the foliage last summer in gladiolus of both growers and infection was heavy in limited areas. The disease has not previously been observed in Ont. (H.S. Thompson, J.A. Parmelee).

Dry Rot (Fusarium oxysporum var. gladioli). About 5% of the corms were affected in a shipment of Clingendaal inspected at Southport, P.E.I. Diagnosis confirmed at Ottawa (J.E. Campbell). Dry rot destroyed corms in storage at Montebello, Que. (P. Duval).

Yellows (Fusarium oxysporum f. gladioli). Some root rot observed in the horticulture plots at the University, Edmonton, Alta. (W.P. Campbell).

Penicillium Corm Rot (P. gladioli) caused mod. damage to a large lot of corms stored in Calgary, Alta. (M.W. Cormack).

Hard Rot (Septoria gladioli). About half of 1000 corms each of Clingendaal and Leeuwenhorst were affected in a shipment from Holland inspected at Southport, P.E.I. Corms showed numerous small hard rot lesions many of which bore pycnidia (J.E. Campbell, J.A. Parmelee).

Mosaic (Phaseolus virus 2): 1-6% infection was observed in 4 gardens examined in Fredericton, N.B. (D.J. MacLeod).

## HELIANTHUS

Wilt (Sclerotinia sclerotiorum) sev. infected a few plants of H. annuus var. Sun Gold in the laboratory beds at St. Catharines, Ont. Sclerotia were abundant inside the stem of one plant examined (W.G. Kemp)

## HYACINTHUS

Yellows (Xanthomonas hyacinthi). A few bulbs were found affected in a field at Brentwood, B.C. (N. Sieffert, W.R. Orchard)

## HYDRANGEA

Powdery Mildew (Erysiphe cichoracearum) caused some damage to plants in a greenhouse at Granby, Que. (J.A. Parmelee).

## IRIS

Leaf Spot (Didymellina macrospora). Only sl. infections were noted in 2/16 plantings of bulbous iris on Vancouver Island, B.C., and none was seen in 4 small plantings inspected on the mainland (N. Mayers). A sl. infection was noted on plants received from Ottawa, Ont. (W.G. Kemp). Leaf spot was sev. on plants at Ste Genevieve de Batiscan, Que. The disease is quite general on plants on sandy acid soil, but is seldom seen on those on alkaline soil (P. Duval). It was observed in 4 Montreal nurseries, where it caused sl.-mod. damage (J. Ringuet).

Bulb Nematode (Ditylenchus dipsaci) was noted in tr. amounts in only 3/16 plantings of bulbous iris inspected on Vancouver Island, B.C. (N. Mayers)

Soft Rot (Erwinia carotovora) was at least one cause of extensive damage that occurred in several plantings at Lethbridge, Alta (M.W. Cormack). One grower suffered heavy loss from soft rot in his iris at Starrs Point, N.S., it was apparently spread by the cutting knife (D.W. Creelman).

Wilt (Sclerotinia sclerotiorum). A few plants of bulbous iris were killed down at Keating, B.C. The pathogen was isolated (N. Sieffert, W.R. Orchard).

Mosaic (virus). Roguing has practically eliminated mosaic from planting of bulbous iris on the mainland, B.C.; not a single affected plant was seen. Infections of tr. and .62% were observed in two plantings on Vancouver Island. Apparently natural spread is slow (N. Mayers).

## LILIUM

Blight (Botrytis elliptica) caused a sev. infection in one corner of a garden planting of L. regale at Kentville, N.S.; a number of small plants were killed down by the disease (K.A. Harrison).



## LUPINUS

Eye Spot (Ovularia lupinicola) was general in flowering lupine plants in a home garden on Salt Spring Island, B.C. (W. Jones).

## LYTHRUM

Leaf Spot (Septoria lythrina Peck) was heavy on specimens of the variety Morden Pink sent from Port Burwell, Ont. This disease has not previously been reported to the Survey (H. S. Thompson).

## MENTHA

Yellows (Callistephus virus 1) was found on four plants of spearmint (M. spicata) in a garden at Fredericton, N.B. (D. J. MacLeod).

## NARCISUS

Neck Rot (Botrytis narcissicola) is usually present in small amounts in plantings on the mainland, B.C. Infections of .5% and .7% were observed in 2/9 plantings on Vancouver Island (N. Mayers).

Bulb Nematode (Ditylenchus dipsaci) was noted in 3/63 fields inspected on the mainland, B.C. Fourteen growers of certified stock have the nematode in their commercial plantings as follows: sl. infestations in 9, mod. in 3 and sev. in 2. In addition to standard control measures, the hot-water formalin treatment and rotation, 8 growers are attempting to eradicate the nematode by spot fumigation. A sl. nematode infestation was found in 1/9 plantings on Vancouver Island (N. M.).

Basal Rot (Fusarium bulbigenum). Only traces were seen in fields inspected in B.C.; the weather was generally cool and sky overcast with the result that soil temperatures were low (N. M.).

Root-Lesion Nematode (Pratylenchus penetrans). Experiments on the control of this nematode are being continued on a farm at Cloverdale, B.C., where it is causing appreciable loss (N. M.).

Leaf Scorch (Stagonospora curtisii) caused sev. damage in 2 fields on the mainland, B.C.; one was 2-year-old planting and the other very weedy. In other fields it was present in small isolated patches, except in those planted with bulbs that were given the hot water treatment before planting last fall. These fields were free of scorch (N. M.).

White Streak and associated virus diseases were present in every planting of King Alfred inspected in B.C. This year no mainland planting showed over 2.5% infection whereas 1/9 of the Island plantings revealed more than the permitted 2.5%. The light infection in the Mainland plantings was possibly due to masking which occurs when growing conditions are good (N. M.).

Mosaic (virus). Traces were present in every planting in B.C., but the highest infection recorded was 1.2%. However, some varieties not entered for certification are seriously infected (N. M.).

## PACHYSANDRA.

Leaf Spot (Volutella pachysandricola B.O. Dodge). A mod. infection was found on plants in a shipment of plants from New York inspected en route to Port Burwell, Ont. Specimens were submitted to P.L. Lentz, U.S. Dept. of Agriculture, who identified the fungus as V. pachysandricola, which has previously been reported on the stems of the host (H.S. Thompson).

## PAEONIA - Peony

Blight (Botrytis paeoniae) caused sl. damage in a garden at Lethbridge, Alta. (M.W. Cormack).

Ring Spot (virus). A few plants were found affected at Guelph, Ont.; it appeared to cause little injury to the plants (W.G. Kemp).

Stunt (cause undetermined): 7% of the plants in a plot at the Station, Fredericton, N.B., showed sev. stunt (D.J. MacLeod).

## PELARGONIUM - Geranium

Leaf Curl (Pelargonium virus 1). About 5% of 1000 plants were affected in a greenhouse at Victoria, B.C. (W. Jones). An affected specimen was received from the city horticulturist, Regina, Sask. (R.J. Ledingham). The disease was general in plants being kept as stock plants in a greenhouse at Leamington, Ont.; no serious damage apparent (W.G. Kemp). Two plants were found affected in a greenhouse in Fredericton, N.B. (D.J. MacLeod).

Mosaic (Cucumis virus 1): 4 plants were found affected in a greenhouse in Fredericton, N.B. (D.J. MacLeod).

## PETUNIA

Yellows (Callistephus virus 1) sev. affected 1% of the plants in the border at the Station, Fredericton, N.B. (D.J. MacLeod).

## PHLOX

Powdery Mildew (Erysiphe cichoracearum) was general on P. paniculata at Kentville, N.S.; one planting was sev. affected (D.W. Creelman).

Blight (?virus) was sev. on P. paniculata in many gardens in Montreal, Que., including the Botanical Garden (P. Duval). A tr. was found on the border at the Station, Fredericton, N.B. (D.J. MacLeod).

## RHODODENDRON

Leaf Blister (Exobasidium vaccinii). Affected azalea leaves were received from a home garden in Chilliwack, B.C. (I.C. MacSwan).

Leaf Spot (Phyllosticta sp.). A mod. infection was found on a few rhododendron shrubs in a home garden at Keating, B.C. (W. Jones).

## ROSA

Crown Gall (Agrobacterium tumefaciens). An affected specimen sent in from Bengough, Sask. (T.C. Vanterpool). At Montreal, Que., crown gall killed a few rambling rose plants obtained from a B.C. nursery (P. Duval). An affected Dolly Varden plant was received from Montague, P.E.I. Galls occurred all along the stem of a climbing rose brought in from Kensington (J.E. Campbell).

Grey Mould (Botrytis cinerea) was observed causing a bud blight in the variety Banchee at Winnipeg 26 July. It is quite common at Winnipeg after heavy rains followed by bright sunshine (J.E. Machacek). A sl. infection was noted in a small garden at Ste Anne de la Pocatiere, Que. (H. Genereux).

Brown Canker (Cryptosporium minimum Laubert) was causing sev. damage on a few bushes at Royal Oak, near Victoria, B.C. A specimen (DAOM 45521) collected 8 June was sent to Ottawa where the determination was confirmed by comparison with the type and with a specimen collected at Hood River, Oregon, determined by Anna E. Jenkins and verified by R. Laubert; the specimens were loaned from the U.S. National Collections. Pustules very numerous, rupturing the epidermis; spores hyaline, allantoid, 14.4-19.2 x 2.4-3.2 microns. Reported by Anna E. Jenkins (Plant Dis. Reprtr. 18:157. 1934) from Oregon and Pennsylvania. First report of its occurrence in Canada (W. Jones, Ruth Horner).

Black Spot (Diplocarpon rosae) is troublesome every year on hybrid tea roses in many rose gardens in St. Catharines and at Niagara Falls, Ont. The McGrady roses are highly susceptible and suffer extensive defoliation (G.C. Chamberlain). A mod. infection was observed at the Montreal Botanical Garden and diseased specimens were received from Pointe Claire, Que. (P. Duval). Black spot was common on escaped R. Eglanteria growing in neglected pastures and along stone fences at Franklin Centre (L. Cinq-Mars). Black spot mod. infected hybrid tea roses at Bridgewater, N.S. (D.W. Creelman).

Rust (Phragmidium montivagum) was common on wild roses in Edmonton, Alta. (W.P. Campbell). A tr. (Phr. speciosum) was found at Mahone Bay, N.S. (D.W. Creelman).

Powdery Mildew (Sphaerotheca pannosa) was particularly sev. on Crimson Rambler and Dorothy Perkins at St. Catharines, Ont. (G.C. Chamberlain). The disease was mod. on 6 bushes of climbing roses in Rockcliffe Park (H.N. Racicot). Powdery mildew was present on roses in the Montreal Botanical Garden and on specimens received from St. Basile le Grand, Que. (P. Duval). The disease was heavy on a few bushes at Chatham, N.B. (S.R. Colpitts). A mod. infection occurred on a climbing rose at Kentville, N.S., and at Belvedere, P.E.I. (J.E. Campbell).

2, 4-D Injury. Affected leaves were received from a rose garden in Vancouver, B.C. (I.C. MacSwan).



## SAINTPAULIA

Powdery Mildew (?Erysiphe cichoracearum) was found affecting several plants in a home at Leamington, Ont. When the oidea were used to inoculate cucumber, the fungus attacked the latter and sporulated (C.D. McKeen).

## SINNINGIA - Gloxinia

Tuber Spot (Thielaviopsis sp.). A shipment of gloxinia from Michigan was refused entry because 50% of the tubers showed shallow, black, somewhat powdery, circular lesions over the surface of the tuber (J.A. Parmelee).

## SYRINGA

Powdery Mildew (Microsphaera alni) was common on lilac in the Niagara peninsula, Ont. (G.C. Chamberlain).

Bacterial Blight (Pseudomonas syringae). An affected specimen received from Naicam, Sask.; bacterial ooze was present (T.C. Vanterpool).

## TAGETES

Yellows (Callistephus virus 1) mod. infected "giant" marigold plants at Charlottetown, P.E.I.

## TULIPA

Fire (Botrytis tulipae). Both primary and secondary infections were again general throughout plantings in B.C. Secondary fire was prevalent in tulips of two large growers on the mainland; a late frost had affected many buds sufficiently to permit rapid increase of infection. Primary infections were noted in over a third of the plantings on Vancouver Island (N. Mayers). Affected plants brought in from a city garden in Vancouver (I.C. MacSwan). Over 100 plants were affected in a home garden containing about 200 tulips in Lincoln Co., Ont. (W.G. Kemp). Fire was sev. in the test garden at the Botanical Garden, Montreal, Que.; affected specimens received from Riviere du Loup (P. Duval). The disease was present in most small gardens at Kentville (J.F. Hockey) and at Wolfville, N.S. (D.W. Creelman). Fire was general and sev. in Charlottetown, P.E.I.; the weather was wet for prolonged periods (J.E. Campbell).

Bulb Rot (Penicillium sp.). Penicillium sp. was isolated from decaying bulbs brought to the laboratory from Lincoln Co., Ont., on 17 May (W.G. Kemp). In a shipment of 500 bulbs of T. fosteriana var. Red Emperor from Holland showed extensive damage by Penicillium sp. (J.E. Campbell). It seems probable that these bulbs suffered mechanical injury or heating in transit. Under such conditions Penicillium may invade

the bulb and continue to spread after the bulb is planted. Growth or flowering may be prevented (F. L. Drayton).

Root-Lesion Nematode (Pratylenchus penetrans). A tr. infection was present in tulips in a field at Cloverdale, B.C. (N. Mayers, J. E. Boshier).

Root and Bulb Rot (Pythium ultimum). A 100-bulb planting made in the fall of 1952 and again in 1953 were a total loss each year in a garden in Ottawa, Ont. Isolations from the dark grey, more or less water-soaked lesions on the bulb scales yielded P. ultimum (H. S. Thompson). It would appear the site was not well drained (I. L. C.).

Neck Rot (Rhizoctonia solani). A sl. infection was found on plants of Red Pitt and William Pitt forced in the greenhouse at Edmonton and Calgary, Alta. (E. C. Reid, W. R. Orchard).

Grey Bulb Rot (Sclerotium tuliparum). An 18% infection was seen in forced bulbs of Alberio, Bruno Walter and Golden Measure in a greenhouse at Langley, B.C. (W. Touzeau, W. R. Orchard).

Frost Necrosis was noted affecting about 25% of the plants in a bed of Darwin tulips in Queens Co., P.E.I. A heavy frost at night is believed to have caused the injury. It had the appearance of a bacterial infection but no organism was associated with the spots. It agreed with the description given by L. R. Jones and M. Miller (Phytopathology 9:10-11, 1919) (R. R. Hurst).

## VIOLA

Powdery Mildew (Sphaerotheca humuli) mod. affected pansies late in the season in 2 gardens at Lethbridge, Alta. (M. W. Cormack).

## ZINNIA

Foot Rot (Phytophthora cryptogaea). A few plants of Z. elegans were killed in a home garden at Sidney, B.C. The fungus was isolated and identified as P. cryptogaea (W. Jones).

Yellows (Callistophorus virus 1, western strain). Two plants were found affected in a garden in Fredericton, N.B. (D. J. MacLeod).



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